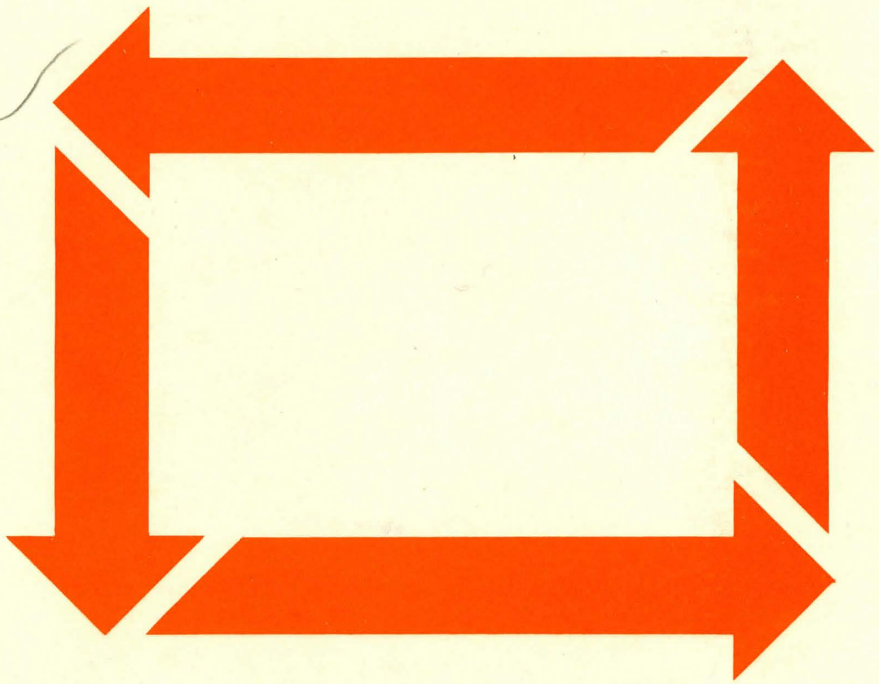
SHENANDOAH



TRAFFIC SAFETY STUDY

HENNINGSON, DURHAM & RICHARDSON

HENNINGSON, DURHAM & RICHARDSON
ARCHITECTURE · ENGINEERING · PLANNING · SYSTEMS · ECOSCIENCES

8404 Indian Hills Drive
Omaha, Nebraska 68114
September 8, 1975

Mr. Merrill Kruse
City Manager - Clerk
City of Shenandoah
Shenandoah, Iowa 51601

Dear Mr. Kruse:

We are pleased to submit the Traffic Safety Study Report for the City of Shenandoah, Iowa.

This report contains a written and graphical accounting of the data, analyses, conclusions, recommendations and the reasons for those recommendations. The recommendations are based upon a careful study of the accident history and the traffic control devices currently utilized by the city on its street system, and are made in the belief that their implementation will benefit traffic safety in Shenandoah.

We wish to thank you, the City staff, the Iowa Department of Transportation, Division of Highways, and the Federal Highway Administration for the assistance and cooperation during the course of this study. We sincerely hope that this report will be a useful guide towards the betterment of traffic safety in the City of Shenandoah.

Respectfully,

HENNINGSON, DURHAM & RICHARDSON

Robert A. Rohling, P.E.
Vice President

Jack S. Schnettler
Transportation Engineer

ea

TRAFFIC SAFETY STUDY

FOR

SHENANDOAH, IOWA

SEPTEMBER 1975

Prepared by

HENNINGSON, DURHAM & RICHARDSON

OMAHA, NEBRASKA

This report was prepared through a grant provided by the United States Department of Transportation, Federal Highway Administration pursuant to the provision of Section 402 of Title 1 of the Highway Safety Act of 1966.

CITY OF SHENANDOAH

MAYOR

Karl S. Bond

COUNCIL

Robert McElroy

Thomas Crane

Martin Hagedorn

Edward Anderson

Kaye Norton

CITY STAFF

Merrill J. Kruse,
City Manager - Clerk

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PART I

INTRODUCTION

The contents of this report document the study efforts undertaken towards the purpose of improving traffic safety and reducing accidents on the city streets of Shenandoah.

In PART II the scope of the study is defined. The basic methodology is outlined, and the work tasks to which that procedure was applied are described. The extent of the involvement of the community in the study is also summarized.

PART III contains a review and informal inventory of existing traffic conditions and traffic control devices currently in use on the City's street system as well as an overview of the available accident history.

In PART IV, the various elements of the existing system of traffic controls are analyzed for suitability, conformance, completeness, and uniformity. Where deficiencies or other conditions were noted, appropriate improvements and modifications were developed and are supplemented by sketches for clarity.

PART V of the report provides a summary of the various recommendations developed in PART IV, including a priority listing, an estimate of improvement costs, and a discussion of various sources of funding for the implementation of the recommended improvements.

The APPENDIX contains material supplemental to the report, including accident collision diagrams and traffic flow diagrams.

PART II

SCOPE OF STUDY

In recognition of the high incidence of traffic accidents and growing traffic demands on its streets, the City of Shenandoah applied for and received a grant for a Traffic Safety Study. This study was funded by the Iowa State Highway Commission (ISHC) and the Federal Highway Administration under Highway Safety Program Standard 13, issued in accordance with the Highway Safety Act of 1966.

The prime objective of this study was to develop measures for the improvement of traffic safety on city streets. This was to be accomplished by the application of accepted traffic engineering practices, principals, and standards to the physical elements of the existing street system and the operational elements of the traffic control devices which regulate traffic on that street system.

Study Approach

The basic study approach was a three-phase process involving the following steps:

(1) Survey of existing traffic conditions, traffic control devices, and accident history. (data collection).

(2) Evaluation of existing system and controls to identify deficiencies and develop solutions. (analysis).

(3) Formulation of suggested improvements and guidelines for implementation. (recommendations)

This study procedure was applied to a set of study work tasks which were formulated in response to the traffic safety and circulation needs of the City. These work tasks comprise the following items:

a. Review of existing traffic control devices, including the proper usage, adequacy, conformance, and placement of regulatory and warning signs, traffic signals and beacons, and pavement markings. For any deficient or non-conforming traffic control usages, changes or additions to upgrade traffic controls to standards are developed.

b. Study of the existing street system to determine where traffic operational changes could be made to enhance traffic safety and circulation.

c. Review of existing on-street parking to include type, location, clearances, compatibility with adjacent traffic lanes.

d. Investigation of accident tabulations and motor vehicle accident reports to identify locations with excessive incidence of accident involvement. Accident collision diagrams and field data (controls, geometrics, sight distances, lighting, parking regulations, and so on) are then reviewed to develop corrective measures to reduce accident occurrence.

e. Study of unusual or potential problem locations, such as multi-legged intersections, railroad crossings, and school crossings to determine if any engineering treatments could be made to improve safety.

This report documents existing traffic control device usages and on-street conditions, evaluation and analysis of identifiable operational and physical deficiencies and needs, and the development of recommendations to correct deficiencies and meet the traffic safety needs of Shenandoah.

Study Area

The study area is generally confined to the street and roads within the corporate limits of the City of Shenandoah (FIGURE 1). Exceptions are made where intersections and streets lie partially within the City limits or where traffic controls or roadway geometrics outside the City limits have a bearing upon traffic safety within the City limits.

Community Involvement

Although the time period for conducting the study was only a few months, efforts were made during the course of the study to solicit the opinions and thoughts of City officials, businessmen, school officials, police, and other interested parties. The joint Chamber of Commerce - City Parking Study Committee, was a primary contact during the course of the study.

The function of the working relationship with local groups and officials was two-fold. First, it opened an additional channel for input of information to the study. Second, it enabled those interested in the study on a local level to be better informed of the progress of the study. The dual function of these contacts was very helpful in carrying out the study.

In the course of the study, conversations and meetings were held with the following parties:

City of Shenandoah

City Manager-Clerk
Chief of Police
Parking Meter Patrolman
Streets Department

Joint Chamber of Commerce/City Parking Study Committee
Vice President, Chamber of Commerce
Resident Maintenance Engineer, Iowa State Highway Commission
Business Manager, and Elementary Principal,
Shenandoah Community Schools
Several Downtown Businessmen

STUDY AREA

FIGURE 1

PART III

EXISTING TRAFFIC CONDITIONS

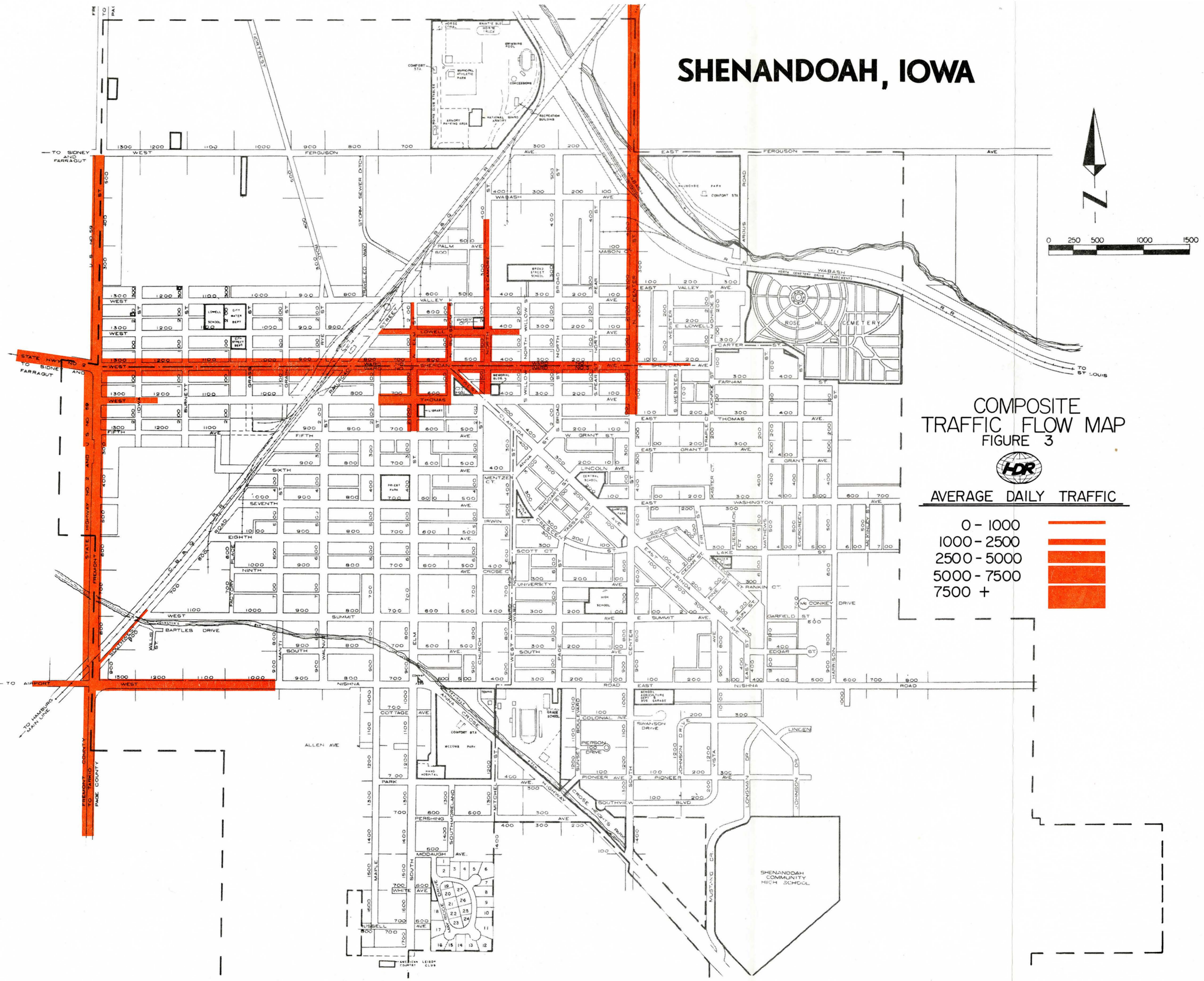
The City of Shenandoah, lying in the valley of the East Nishnabotna River on the west edge of Page County, has a population approaching 7,000 persons. Because of its good geographical location on three major highways, U.S. Highway 59 and State Highways 2 and 48, the City is an important trade center for the rich agricultural lands surrounding it.

Street System

The existing street network is arranged generally in an irregular grid pattern, with several diagonally-oriented streets further altering the grid. Multi-legged intersections of varying configuration occur along these diagonal streets. Such an arrangement tends to break up the monotony of a regular grid system, but conversely, it is characterized by some unusual intersections.

The principal links in the City street system are depicted in FIGURE 2, as derived from The Comprehensive Plan for the City. The primary streets are Fremont Street (U.S. 59), Sheridan Avenue between U.S. 59 and downtown (S.H. 48), Sycamore Street, S.H. 48 north of Ferguson Road, Elm Street between downtown and Nishna Road, Anna Crose Highway, and portions of Thomas Street, Lowell Street, Railroad Street, Willow Street, and Clarinda Avenue in the downtown area.

SHENANDOAH, IOWA



COMPOSITE TRAFFIC FLOW MAP
FIGURE 3

HDR

AVERAGE DAILY TRAFFIC

0 - 1000	
1000 - 2500	
2500 - 5000	
5000 - 7500	
7500 +	

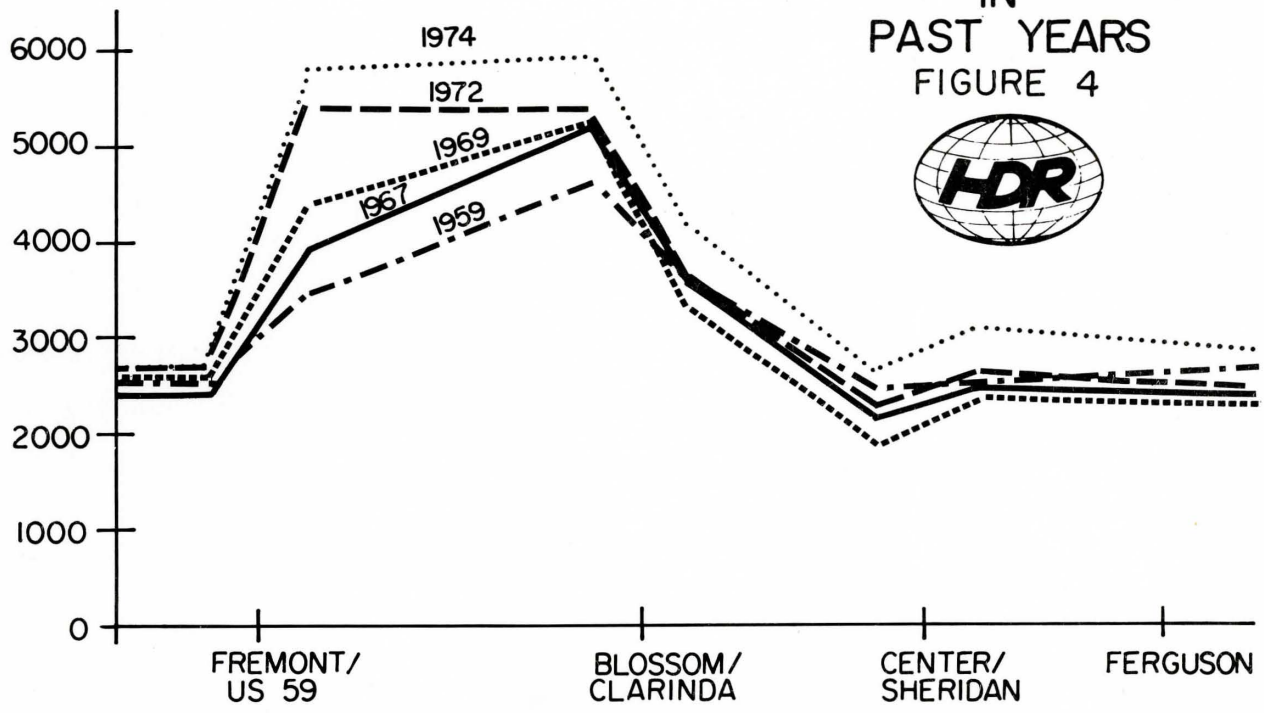
The other principal artery is Sheridan Avenue from Fremont Street to Center Street. It is the major east-west street, carrying traffic from U.S. 59, S.H. 2, and S.H. 48 into and through the downtown area. Moderately high volumes on Sheridan Avenue are sustained at about 5,900 vehicles per day (VPD) between Fremont Street (U.S. 59) and Blossom Street. East of downtown, volumes diminish to 2,640 VPD east of Center Street north on Center Street along S.H. 48, the volume is 3,000 dropping to nearly 2,900 at the north City limits. Intersection turning movement diagrams are located in the APPENDIX of this report.

A history of the traffic volumes on U.S. 59 and on S.H. 48 over the past fifteen years is presented in FIGURE 4. Traffic on S.H. 48 generally has experienced a gradual increase, with little variation in the relative magnitudes. U.S. 59 had exhibited a gradual increase in traffic until the 1972-1974 period. During this time, traffic near each of the City limits dropped about 30%. Traffic levels near Sheridan Avenue, however, were maintained.

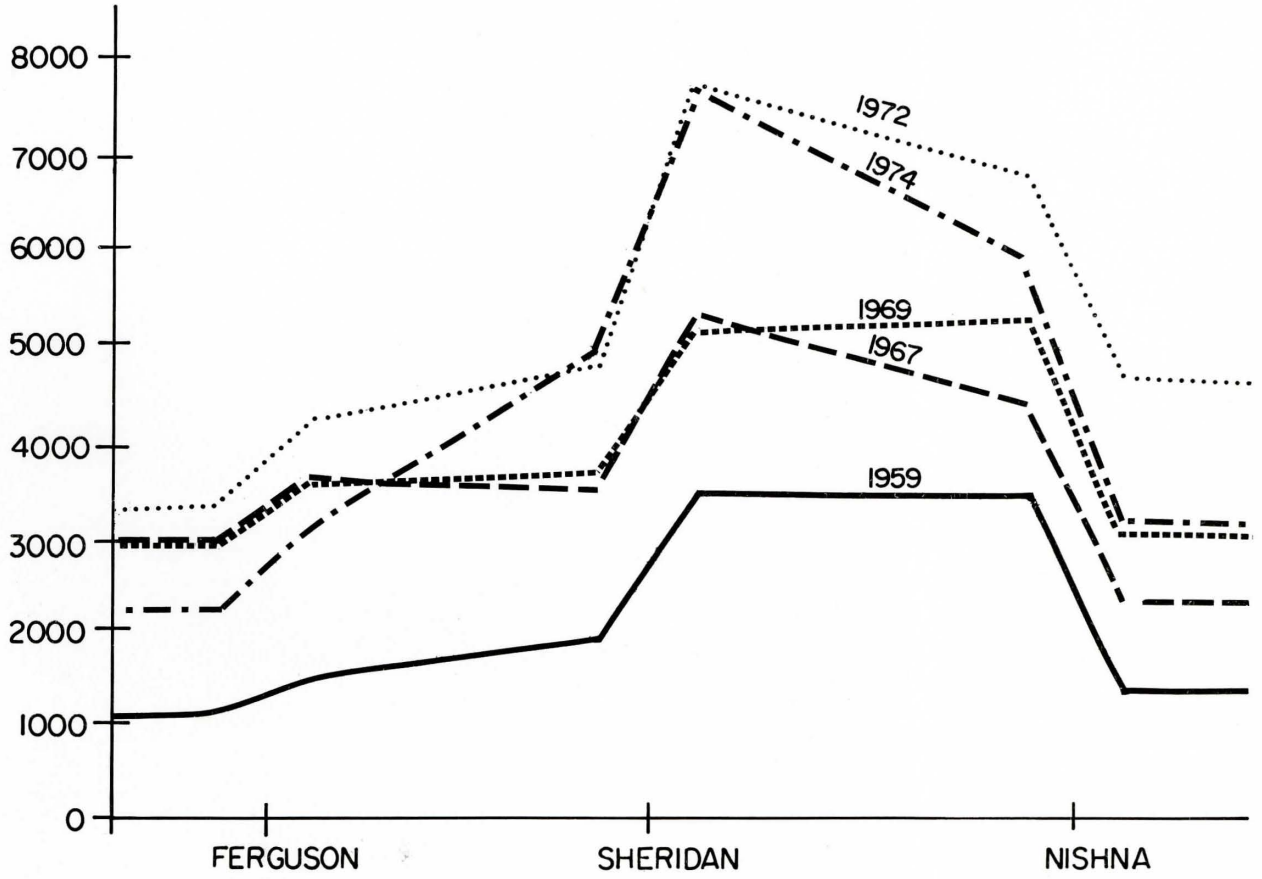
The decrease could be explained in part by the opening of I-29 some 15 or 20 miles to the east. Furthermore, when the relocation of S.H. 2 to the south is completed, a reduction in east-west through traffic on Fremont Street due to the rerouting of S.H. 2 can be expected. The traffic generated by local residents and the downtown business district can be expected to increase in relation to the City's population and commercial activity, although this trend could be offset by the impact of the energy crisis and increasing fuel costs.

TRAFFIC VOLUMES IN PAST YEARS

FIGURE 4



STATE HIGHWAY 48 (SHERIDAN & CENTER STS.) FROM U.S. 59 TO FERGUSON STREET



U.S. 59 (FREMONT ST.) FROM FERGUSON ST. TO NISHNA RD.

The major street system as previously described serves local and out-of-town traffic fairly well. Traffic approaching on U.S. 59 from the north or south has direct access to the Central Business District (CBD) via Sheridan Avenue (S.H. 48), as does traffic approaching from Sidney on S.H. 2. Traffic from Clarinda on S.H. 2 can reach downtown via Anna Crose Highway and Elm Street. Another route would be Center Street and Sheridan Avenue. Traffic from Essex and Red Oak on S.H. 48 is led directly into town via Center and Sheridan Streets.

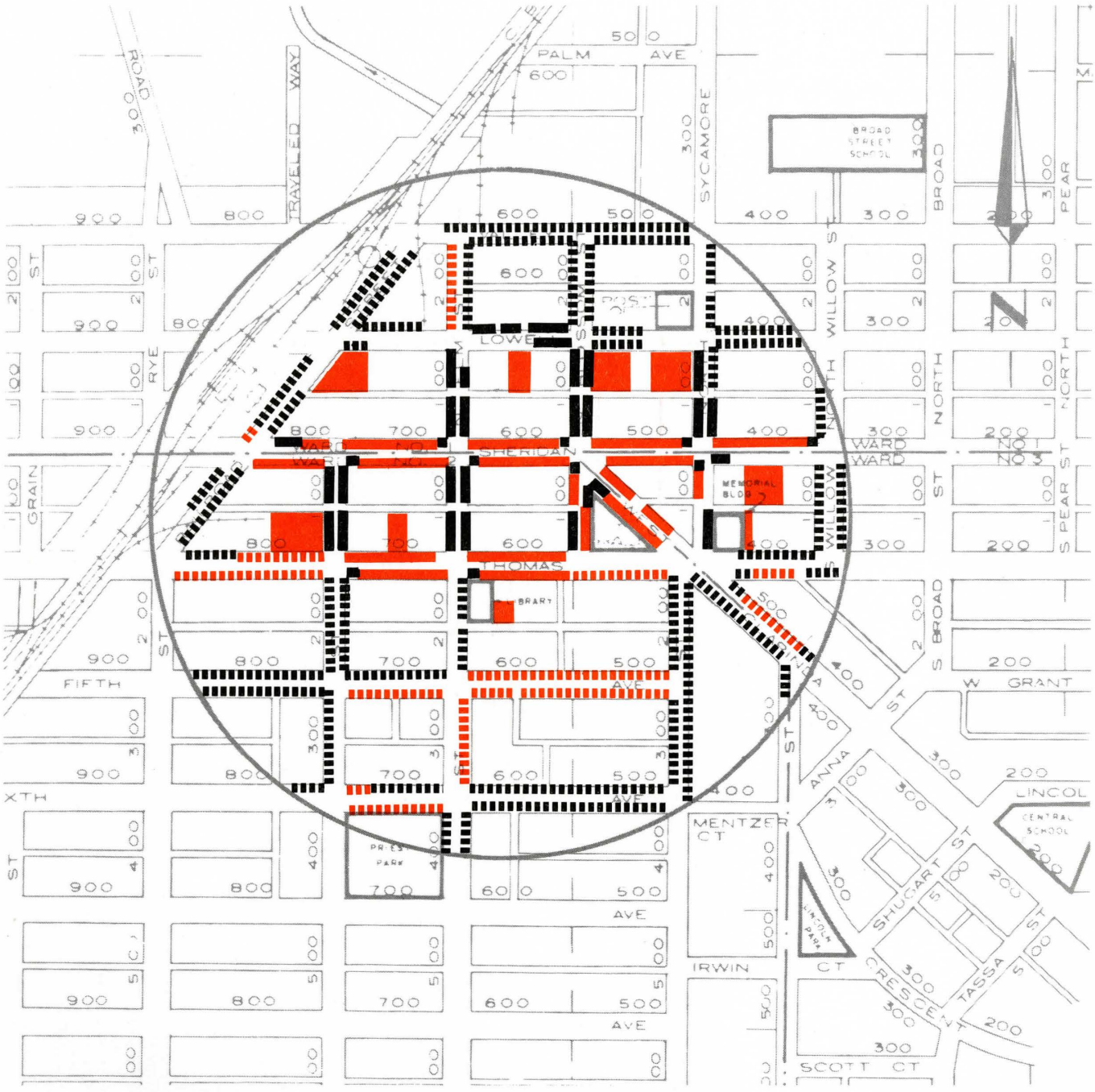
Within the City the prime traffic generator is the downtown area. Secondary generators are the strip commercial area along Sheridan and along U.S. 59, and major employers located near Nishna Road and U.S. 59 - S.H. 2, and in the northwest area of the City north of Valley and east of the railroad tracks. Alternative routes to these areas tend to disperse traffic, although some congestion is experienced at the junction of Sheridan and Fremont Streets (U.S. 59 - S.H. 2 - S.H. 48). Sheridan Ave. in the CBD also exhibits congestion during the midday and late afternoon on weekdays and Saturdays. Much of this congestion is attributable to the conflict between the angle parking on Sheridan and the circulation of traffic. This point is addressed in more detail later in this report.

On-Street Parking

Outside of the downtown area, curb parking is prohibited as necessary to maintain at least one through traffic lane on residential streets, and on arterials to insure two travel lanes. For example, parking is prohibited on the west curb of Center Street along most of its length. Generally, two-sided parking is permitted on most City streets. There are other locations, near schools, for instance, where parking is prohibited. Angle parking occurs in outlying areas at spot locations, for example, adjacent to a church. These scattered uses of angle parking have not caused any significant operational problems to date.

Within the downtown CBD and the immediate vicinity, both angle and parallel parking are utilized in an effort to meet parking demands. These parking spaces are metered in the areas of high demand. These metered and unmetered stalls are supplemented by several City-supported off-street parking lots and by other privately-operated lots. That portion of downtown parking in the public domain is summarized in FIGURE 5.

Metered parallel parking is located on Lowell Street between Elm and Blossom Streets, on Sycamore, Blossom, and Elm Streets between Lowell and Thomas Avenues, on Maple St. between Sheridan and Thomas, and in spot locations on Sheridan and Thomas Avenues. Metered angle parking is used on Sheridan Avenue between Railroad and Willow Streets, on Thomas Street between Elm and Blossom Streets, and on Clarinda Avenue between Sheridan and Thomas Avenues. It is also found in spot locations on Sycamore and Blossom Streets between Thomas and Sheridan Avenues.



LEGEND

OFF STREET LOTS OWNED OR LEASED BY THE CITY

METERED PARKING

ANGLE

PARALLEL

UNMETERED PARKING

ANGLE

PARALLEL

EXISTING DOWNTOWN PARKING

FIGURE 5

HDR

Additional unmetered angle parking in the downtown area is found on Thomas Avenue, 5th Avenue, 6th Avenue, Clarinda Avenue, and North Elm Street as indicated in FIGURE 5. The location of the City-operated off-street parking lots is also given. These lots are unmetered, and the larger ones are marked with appropriate parking area directional signs.

Clearances between curb parking and drives and intersections are generally minimal, with nearly every available foot of curb being devoted to parking. Lateral clearances are satisfactory except on those portions of Sheridan and Thomas Avenues where two-sided angle parking occurs. In these segments approximately 18 feet on each side of the street is utilized by parked vehicles. For street widths of 56 feet, two ten-foot travel lanes remain to accommodate traffic. The angle parking is skewed at 45 degrees with stall widths of 8 feet. Each stall requires curb space of 11.5 feet.

Several field checks along Sheridan Avenue provided a qualitative appraisal of existing traffic flow in the daytime hours.

During the regular commercial hours of operation Sheridan Street resembles a two-way parking lot aisle. The difficulty is that the street has traffic demands upon it which often exceed those which it can smoothly handle with the existing usage of the street width.

Congestion and delay result from several operational hindrances:

1) Vehicles cruising very slowly, searching for a nearby stall, or hoping that one will empty further down the street.

2) Vehicles entering vacant stalls, a maneuver which must be performed slowly.

3) Vehicles attempting to back out of a space, hampered by poor visibility to their right-rear, and by the inability to judge a suitable gap in traffic.

4) Vehicles stopped at signals. This halts circulation, and occasionally prevents vehicles from leaving spaces, as their egress is blocked by traffic stopped at the traffic light.

5) Through (and circulating) traffic must proceed down the street cautiously, being on the alert for vehicles attempting to exit from stalls.

These factors give rise to slow travel speed, a high occurrence of accidents and a high rate of exposure to potential accidents. The posted speed is 20 m.p.h., but is not readily sustained through the business district.

There is possibly one advantage of the existing traffic/parking configuration on Sheridan Avenue (other than maximizing storage space for vehicles). That is, the low speed yields a low accident severity on this segment of Sheridan and also is a reason why the occurrence of accidents in the actual conflict area of intersections is fairly low.

Usage of the angle parking on Sheridan Ave. is extensive during shopping hours, exhibiting a high occupancy rate during these periods. The time limit on most meters is one hour, but lesser periods of usage

are possible. Meters are patrolled by one man who issures tickets for violations. Meter feeding is not permitted, but does occur by both shoppers and employees. Angle parking on Thomas Avenue is well-used also, but field review indicated that the turnover rate was not as great. Other metered parking on Thomas Avenue and on the north-south cross streets was also well-utilized.

The off-street lots which are owned or leased by the City are usually full during the day. An exception is the largest lot at Railroad Street and Thomas Avenue. Being at one end of the business district, its usage was not as intense, with the lot usually about half full.

The other, smaller off-street lots tend to serve the short-term demands of immidiately adjacent businesses, or long-term employee parking demands. Consequently, the major relief they provide to Sheridan Avenue is in the form of an alternative supply for employees, thus freeing metered parking on Sheridan for customer usage. However, the size and location of some of the lots tend to convert them to private lots in the sense that they are monopolized by businesses bordering the lot. This situation does at least free on-street stalls for other usage.

Illegally parked vehicles were not a frequent occurrence, as most curb space is already given to parking. The principal problem areas in this regard were:

1) Elm Street between Sheridan and Thomas Avenues - Occasional double-parking of short-duration was noted in this block. Principal causes were a dry-cleaning store, a newspaper, and a shoe repair shop, all fronting on Elm Street. Typically, this occurred when no spaces seemed available to the motorist.

2) The alleys paralleling Sheridan Avenue to the north and south in the CBD. These were occasionally blocked by delivery trucks, which is acceptable. However, some improper parking of automobiles blocked the use of the alleys by other cars, as well as delivery trucks.

3) The curb adjacent to the Post Office at the corner of Sycamore and Lowell. The entire curb from mid-block on Sycamore between Valley and Lowell south to Lowell and then west on Lowell to the end of the building is clearly painted yellow, indicating "No Parking", but no regulatory signs are used to complement the curb markings. At one end of the building is a curb drop-off mailbox and just past it is a 15-minute off-street lot for postal patrons which is not greatly utilized. This situation causes minor congestion from time to time and in 1973 occasioned three accidents.

Another incident observed in the field on a Monday morning at 11:00 A.M. was a garbage truck making frequent stops on Sheridan Avenue in the CBD for trash pick-ups. It is not known if this is a regular practice, but the effect on traffic was very undesirable. Vehicles were backed up behind the truck and had difficulty getting around it with the oncoming traffic.

In summary, parking-related traffic operations problems are for the most part found in the downtown area. In outlying areas, parking is restricted where necessary to provide at least a minimum of travel width.

Traffic Control Devices

To safely control and regulate traffic on a city street system, many different signs, signals, and pavement markings are used. An additional tool is the lighting of streets and intersections, for improved night-time driver visibility as well as for the discouragement of crime.

In Shenandoah, a variety of traffic control devices are employed on City streets in an attempt to smoothly govern traffic flow, define right-of-way in conflict situations, and otherwise enhance the safety of the motoring and pedestrian public.

These control devices and aids fall into several categories as follows:

1. Signs
   (a) Guide - such as street signs or mileage signs
   (b) Regulatory - such as speed limits, parking regulations, and non-signalized intersection controls
   (c) Warning - such as pedestrian crossings, curving or winding roads
2. Beacons - Flashing amber of red warning signals usually used in complement with traffic regulatory signs.
3. Signals
4. Pavement Markings - Crosswalks, lane striping, delineation of parking stalls, and curb parking prohibition (usually in conjunction with regulatory signing.)
5. Street Lighting - Overhead illumination of streets during darkness, usually of the incandescent or mercury-vapor type.

The usage of many of these devices in the City does not conform to current practices described in the Manual on Uniform Traffic Control Devices (MUTCD). This publication guides the placement, usage, and conformance of traffic control devices on a nationwide basis to develop uniformity of traffic control across the country.

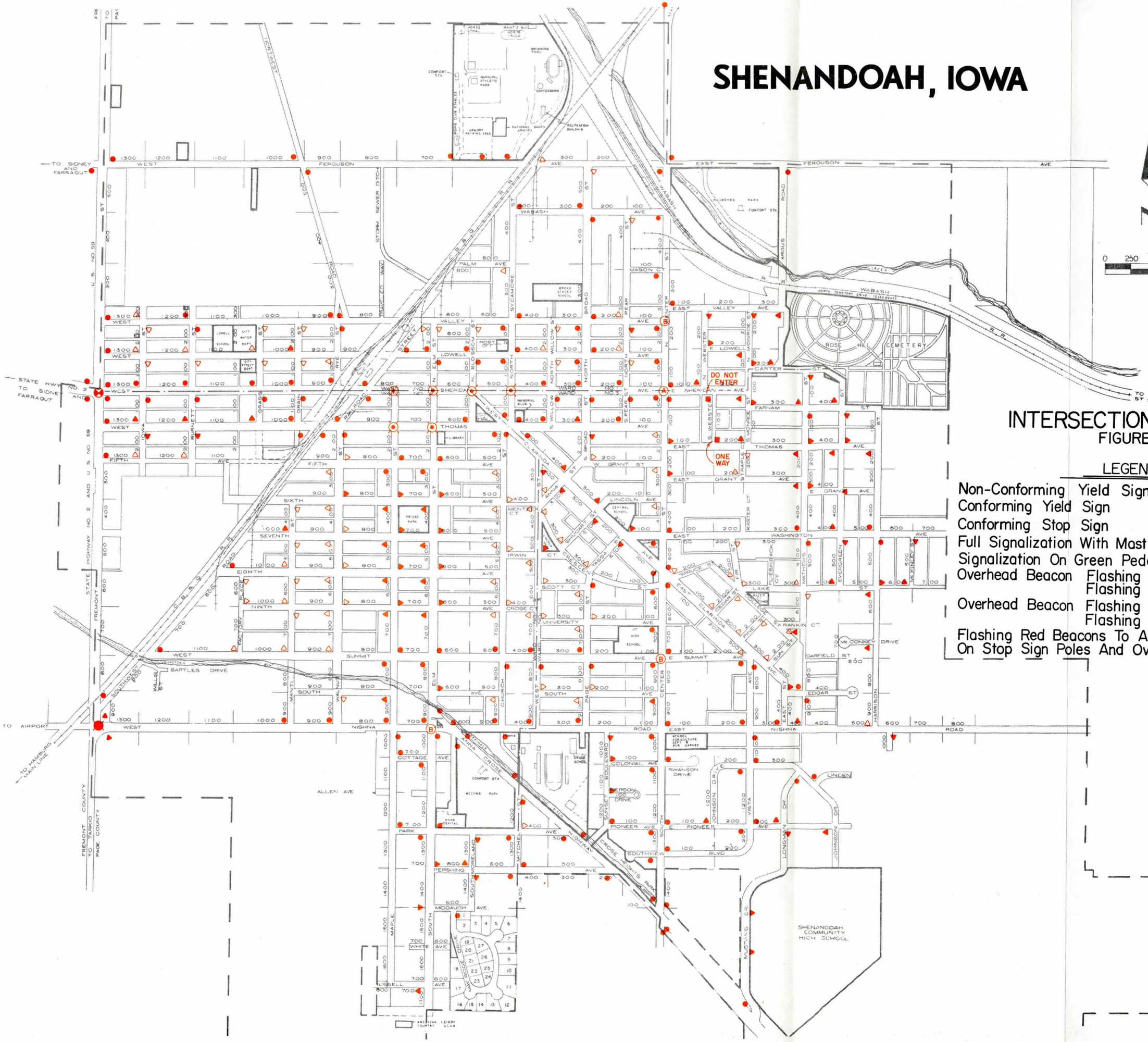
Intersection Controls

Most of the intersections in Shenandoah are controlled by the use of yield or stop signs, with supplemental flashing beacons at five locations. Seven intersections have traffic signals: six in the CBD and one on the outskirts at Nishna Road and U. S. 59-S. H. 2. There are four intersections that were not controlled with signing.

The existing intersection controls are summarized graphically in FIGURE 6. It is apparent that a great many intersections are controlled by yield signs. In fact, of the more than 220 intersections in the City about 125 are controlled by yield signs. About half of those yield signs are the non-conforming, four-sided truncated-triangle type with a black legend on a yellow background. Some are completely illegible, but most are still readable.

Most of the new, red and white triangular yield signs are part of a recent updating program undertaken by the City. However, the usage of some of the new, as well as some of the older yield signs, may be questionable. That is, not all the corners may require any signing at all, while some may warrant replacement with stop signs for one of several reasons.

SHENANDOAH, IOWA



INTERSECTION CONTROLS
FIGURE 6

LEGEND

- Non-Conforming Yield Sign
- Conforming Yield Sign
- Conforming Stop Sign
- Full Signalization With Mast Arms, 12" Faces
- Signalization On Green Pedestals, 8" Faces
- Overhead Beacon Flashing Red To W,S,E; Flashing Amber To N
- Overhead Beacon Flashing Red To Cross St.; Flashing Amber To Major St.
- Flashing Red Beacons To All Approaches Mounted On Stop Sign Poles And Overhead

Stop signs are utilized at about 40% of the intersections and in most cases properly. Three have deteriorated reflectorization which reduces the visibility of the sign. A few others are the smaller 24-inch size and in some instances may require upgrading to the 30-inch size.

At five locations stop signs are used in conjunction with yield signs creating a potentially hazardous or at least confusing situation. At two locations, one of the approaches is not required to stop while the remaining approaches are required to stop. This too contributes to confusion and ultimately to an occasional traffic accident.

Flashing beacons are employed at five intersections in the City. Two of the units, those at Center and Summit, and Center and Valley, flash amber to Center Street and red to the cross street. The one at Valley is located at a school crossing and that at Summit is adjacent to the Junior High School.

The beacon installations at Center and Sheridan and at Nishna and Elm are supplemental to the posted intersection control signs. In both cases, one approach receives a flashing amber indication while the remaining three are given the flashing red. As these are right-angle intersections, some driver confusion and uncertainty can be expected to occur at these locations.

A similar situation exists at the six-legged intersection of Clarinda, Thomas, Sycamore, and Church. In this situation, the traffic approaching from the northwest is not required to come to a stop while all others are.

The final flashing beacon installation is at the four-way stop at U.S. 59 - S.H. 2 - S.H. 48 (Sheridan Avenue and Fremont Street) on the west side of town. In addition to a stop sign on each approach, a flashing red beacon is mounted above the stop signs, and a four-way flashing beacon hangs over the intersection.

Six similarly signalized intersections are found on Sheridan Avenue at Maple, Elm, Blossom, and Sycamore and on Thomas Avenue at Maple and Elm. All are of the pre-timed type. They operate on a 50 second cycle, with two 25 second phases, each including a 22 second green time and 3 second amber. These signals are not interconnected, so there is no intentional progression through them. The signals are mounted on green pedestals. Each face consists of 8 inch red, amber, and green indications shielded by green visors.

At the four-legged intersections, pedestals are located on each corner, thus providing two far-side signal indications to each approach. At Sheridan and Maple, the three-legged corner is handled similarly.

At Sheridan and Blossom, the five approach legs necessitate one extra pedestal and signal face for northbound Blossom Street, and two additional signal faces, one on the northwest corner for northwest bound Clarinda, and another on the southeast corner for northbound Blossom.

This unusual situation allocates Blossom Street and Clarinda Avenue green light simultaneously. Driver familiarity and light volumes on some of the movements are possible explanations as to why this installation seems to work satisfactorily.

In general, the signal faces and poles are not readily visible to the motorist against the background. With the angle parking on Thomas and Sheridan Avenues, the indications are somewhat off to the side of the drivers path. Also, depending on light conditions, some of the indications are not very bright and are then difficult to see.

Supplemental "no left turn" signs are used at Sheridan and Elm and at Sheridan and Maple on Saturdays during the peak shopping period. The signs are white on blue and mounted on a portable device for placement in the center of the intersection. Their use expedites through traffic flow at the expense of local circulation.

The only actual pedestrian signal indications in the City are located at the Sheridan-Blossom-Clarinda intersection on the south and southeast legs. When Sheridan Avenue has the green, these two cross-walks are given a "walk" indication. Traffic turning off Sheridan can interfere with the safe passage of pedestrians. There is no "don't walk" indication; the "walk" indication is merely off at these times.

The seventh of the traffic signals is located at Nishna Road and U.S. 59 - S.H. 2 near the southwest corner of the City. This signal features semi-actuated timing with detectors on east and west approaches. The hardware, signal faces, and mast arms all are in conformance with the MUTCD.

However, each approach of Nishna Road is controlled by two signal faces mounted on the far side of the intersection on a mast arm pole and on a separate pedestal. These controls do not provide optimum visibility to Nishna Road traffic. From both directions, the faces are mounted at such a height that

background objects and light lessen their target value. Moreover, on the east approach, the location of the far side signal indications is such that they are partially obscured by the near side mast arm pole and pedestal. This situation is related to accident experience at this intersection, explained in the next part of the report.

School Crossing Controls

School crossings are marked at ten locations around the City. These are marked or controlled in various manners as illustrated in FIGURE 7. The locations on West Sheridan Avenue and North Center Street utilize the new five-sided school advance and school crossing signs.

Three locations are posted with "Slow-School" signs with a silhouette figure of a child. These are supplemented with a 25 mph speed limit sign, although the speed limit is 25 mph at all school crossing locations except southwest of Logan School on Anna Crose Highway where the speed limit is 35 mph.

The remaining crosswalks are signed with diamond warning signs bearing the legends "School", "School Crossing," or "Slow, School Crossing Ahead". A few other "Slow, School" signs are posted near the Junior and Senior High Schools.

In addition, 13 additional signs are scattered across the city, mostly near crosswalks, and bear the legend, "Children - Slow" with a figure of a child. Below the legend is given the name of the local bank which apparently contributed the signs. Many of these signs are illegible and such signs with advertising are clearly not in conformance with accepted standards.

SHENANDOAH, IOWA

N

0 250 500 1000 1500

SCHOOL CROSSINGS
FIGURE 7

HDR

LEGEND

Elementary School	E
Junior High School	J
High School	H
Elementary Attendance Areas	.....
Crosswalk	=
School Advance Sign (S1-1)	⌂
School Crossing Sign (S2-1)	⬟
School	◇
Slow School Crossing Ahead, School Crossing	◆
Slow School	▯
Children Slow (Bank Sign)	◩

All crosswalks are manned by responsible 4th graders with appropriate crossing vests, under a program sponsored by the Iowa Triple A Club. Five of the crossings are further controlled by portable stop-sign units placed in the center of the streets during the periods of about 8:00 - 9:00 A.M., 11:00 A.M. - 12:15 P.M. and 3:00 - 3:45 P.M.

At three locations, the portable stop signs turn a two-way stop into a four-way stop. The other two crossings are at mid-block locations. The crossing on Anna Crose Highway is not patrolled at present by crossing guards, although at one time it was manned by a man on the maintenance staff of Logan School.

Speed Limits

Generally, the speed limits are lowest in the CBD and greater in the outlying areas. In the downtown area the posted limit is 20 mph. Remaining streets are posted at 25 mph except the following: Center Street north of Wabash, Ferguson Avenue west of Sycamore and east of Argus Road, Nishna Road east of Harrison and west of Manti Street, Anna Crose Highway, and U.S. 59 (Fremont Street). Speeds on these sections range from 35 to 55 mph.

In most cases the speed limits are appropriate for the street dimensions, curb parking, abutting land uses, geometrics, and traffic controls. One noted exception is on Center Street (S.H. 48) in the vicinity of Ferguson Ave. On southbound S.H. 48 heading towards Ferguson Ave., the speed limit is 45 mph. Just south of Ferguson Ave. it is reduced to 25

mph. The unusual intersection geometrics of Center Street and Ferguson Ave. and the numerous railroad crossings in the vicinity suggest the speed limits should be reviewed in this area.

Lighting

Nighttime driving is considered more hazardous than day driving, due primarily to the greatly reduced visibility of roadway design and control elements and adjacent physical features along the roadway. Numerous studies have indicated conclusively that adequate street lighting results in reduced nighttime accident rates. This is attributable to improved visibility of roadway features and of other motorists or pedestrians also using the roadway.

In addition to proven accident reduction, the illumination of streets during darkness increases driver comfort and convenience, acts as a deterrent to crime, and generally enhances property values and public welfare.

In Shenandoah, the City recently completed a street lighting program involving mercury vapor lighting. Consequently, the street system is well lighted. During nighttime field checks no poorly lit locations of significance were observed. Review of accident records likewise did not indicate that poor lighting was a major contributing factor in accidents.

Railroad Crossings

Principal railroad grade crossings are found at eight locations. These locations are all marked with the familiar "railroad crossing" cross-buck. The crossings on North Center Street near Wabash Ave. and on U.S. 59 at Southwest Road are signalized. The new installation on U.S. 59 includes indications on an overhead mast arm. Both these locations as well as the crossing on Sheridan Ave. at Railroad Street employ the railroad advance warning signs.

The crossing surface conditions range from good at the U.S. 59 crossing to poor at the crossings on North Center Street (S.H. 48) and Ferguson Ave. The latter crossings must be negotiated at a very slow speed, for both the reasons of vehicle control and driver comfort.

Operations at these crossings is satisfactory as train movements are not substantial and occur at slow speeds. Only one automobile-train related accident was noted. This accident actually involved a vehicle and a train conductor, not a collision with a train. Two other accidents occurred on or near crossings but did not involve trains.

Only the grade crossing on U. S. 59 near Southwest Rd. has pavement markings in advance of the actual crossing. These markings, as discussed in Section 3B-16 of the MUTCD, are used properly, although at the time of the study they were only partly visible due to wear.

Pavement Markings

Presently, the ISHC maintains pavement markings on those highways and streets that are "U.S. - numbered" or State highways. On U.S. 59, these consist mainly of lane and centerline striping. On S.H. 48 a centerline stripe is maintained by the State except between Rye and Center Streets. The slow travel speed and congestion, it is felt,do not warrant striping. Striping in this area would be difficult to perform and properly maintain.

The City presently stripes angle and parallel parking stalls in the downtown CBD. It also maintains pedestrian crossings in downtown at the major intersections. These crossings are marked with two parallel white bands.

Painted school crosswalks are the responsibility of the Shenandoah Community School District.

At the time of the study, most pavement markings, except those on U.S. 59 and S.H. 48 north of Ferguson Street were not clearly visible. This is not uncommon by the end of an average or worse than average winter.

Accident History

Traffic accident records covering the period from January 1973 to December 1974 were made available by the City Police Department. Actual record forms for prior years had already been disposed of. The accident data for reported accidents were recorded on the two-page version of the "Investigating Officers Report of Motor Vehicle Accident". A newer, longer form organizing the accident information to facilitate eventual computer coding was put into use in January 1975.

These accident reports are filed in numerical order according to the report number. A cross-reference file is intended to provide a record of accidents by their generalized location in the City in the following manner. The City area is divided on a map into 24 large "sections" each covering about one-fourth to one-third of a square mile. Each of these areas is subdivided into about 20 "blocks". Most "blocks" encompass one intersection and the approaches to it.

The date and parties involved in an accident are recorded on index cards according to the "Section" and "block" in which the accident occurred. This information is recorded continuously over the years for each "block" of each section. The exact location or type of accident cannot be retrieved from these cards.

The principal value of these cards was to provide the traffic engineer a listing of the dates of accidents which occurred at or near a certain intersection. This list could be then used to pick out the appropriate accident reports for a particular year, if that year were still on file.

The Police Department also maintains an accident pin map which shows the location and type of the traffic accidents to date for the current year. The maps are not photographed at the end of the year, so no permanent records are available.

At the time this study was initiated, the 1974 pin map had just been taken down, with no permanent record having been made. Consequently, the only indication of high-accident locations was several years' accumulation of pinholes in the base map.

The available data were reviewed and studied to determine intersections or locations with a high accident experience, prepare accident collision diagrams, and evaluate recurring accident patterns.

From the data collected, a total of 577 accidents were reported in 1973 and 1974 to the Shenandoah Police Department. The total reported in 1972 was 244 accidents. The breakdown of the accidents on a monthly basis is as follows:

TABLE 1 - SUMMARY OF ACCIDENTS BY MONTH

	1973	1974
January	31	34
February	26	27
March	22	14
April	24	26
May	33	15
June	16	24
July	22	30
August	18	22
September	25	22
October	19	19
November	37	24
December	34	23
TOTAL	297	280

Of the 577 reported accidents for the study period, 51 occurred at off-street locations with six private parking areas accounting for 39 accidents. Fifteen of the reported accidents were at locations entirely outside the City, and 12 of these occurred on parking lots of two business establishments.

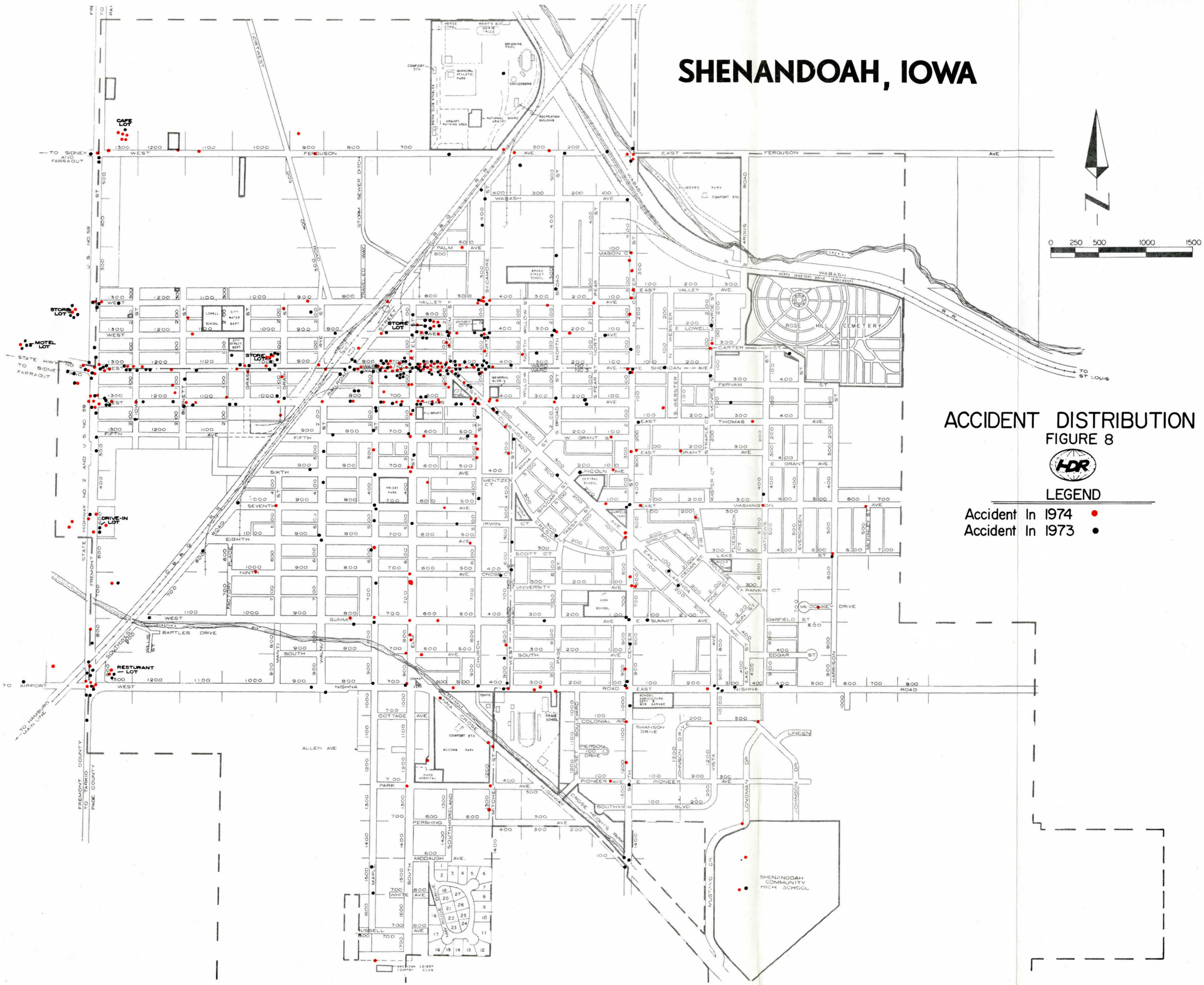
No cost summaries are available for property damage to vehicles involved in accidents, for damage to personal property, or for costs of injuries incurred in the accidents, as the accident reports were often incomplete in this regard. Forty personal injuries were recorded in 1973, with about three-fourths of

these of a minor nature. Accident severity is low because of the low speeds at which most vehicles collided. The last fatality was recorded three years ago.

A geographical summary of accident locations is presented in FIGURE 8. The map shows at a glance the areas of high accident involvement. Predominant clusters are the section of Sheridan Avenue in the CBD, several locations along U.S. 59, and a few other scattered locations.

A high-accident location is defined for this study as an intersection with five or more accidents per year. Consequently, locations with five or more recorded accidents in one year, or locations where a readily identifiable pattern of accidents could be discerned, were considered as locations with significant accident experience. Collision diagrams for these are located in the APPENDIX of the report. Discussion of accident experience and remedial measures are presented later in this report for each problem area.

SHENANDOAH, IOWA



ACCIDENT DISTRIBUTION

FIGURE 8

HDR

LEGEND

Accident In 1974 ●

Accident In 1973 ●

PART IV

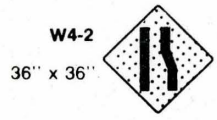
ANALYSES AND CONCLUSIONS

In this section existing traffic control devices and their usage, accident experience, geometrics, and other elements of the existing on-street driving environment are evaluated. Where deficiencies, inconsistencies, and other operational or traffic control problems are identified, modifications and updates are formulated towards the improvement of these problem areas and the enhancement of public safety.

In this evaluation, reference will be made to standards for signs, signals, and their proper usage contained in the Manual on Uniform Traffic Control Devices (MUTCD). These standards provide guidelines for the design, placement, operation, maintenance, and uniformity of application for all traffic control devices. For convenience, references will be made to various sections of the manual, such as Section 2A-11, which refers to standard sign colors, or to certain standard signs contained in the manual, for example, S1-1, a School Advance sign. Signs to which reference is made frequently are illustrated in FIGURE 9. General guidelines for placement of signs are given in FIGURE 10.

School Crossings

In reviewing the relation of the four elementary schools to their attendance areas as illustrated in FIGURE 7, it was determined that existing school crossings are both necessary and sufficient to meet existing travel paths of students to and from schools. An additional crossing on Elm Street near Summit Avenue or Nishna Road to serve children coming from or going to Logan School was considered. It was found that at the present time, a crossing was not necessary in this area. School officials concurred on this matter.



PAVEMENT WIDTH TRANSITION SIGN

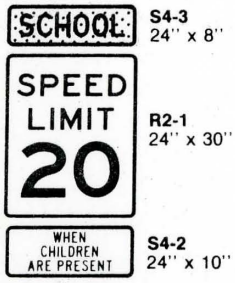
CROSSROAD SIGN

SIGNAL AHEAD SIGN

SCHOOL ADVANCE SIGN

SCHOOL CROSSING SIGN

RIGHT LANE ENDS SIGN

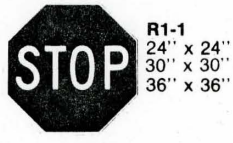


SCHOOL SPEED LIMIT SIGN ASSEMBLY

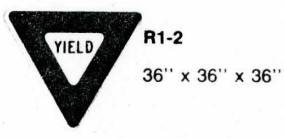
RAILROAD ADVANCE SIGN

RAILROAD CROSSBUCK & AUXILIARY SIGN

DO NOT ENTER SIGN



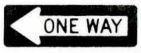
STOP SIGN



YIELD SIGN

NO RIGHT TURN SIGN

SELECTED SIGNING
FIGURE 9A



R6-1L
R6-1R
36" x 12"

ONE WAY
SIGN

R6-2R
R6-2L
18" x 24"

ONE WAY
SIGN

R3-7L
R3-7R
30" x 30"

LANE CONTROL
SIGN

W9-11
18" x 24"

SLOW SCHOOL
(NON-CONFORMING)

W1-7
48" x 24"

LARGE ARROW
SIGN

12" x 36"

OBJECT MARKER
SIGN

18" x 24"

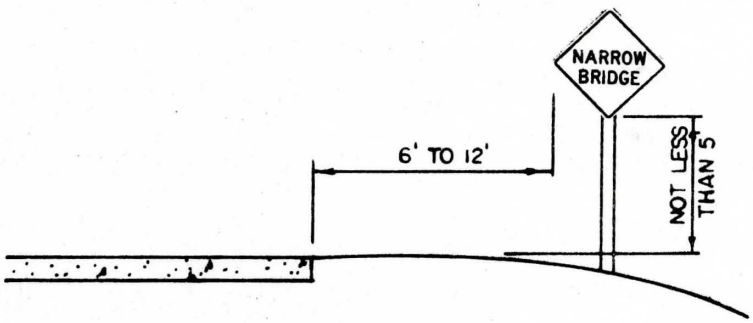
18" x 24"

18" x 24"

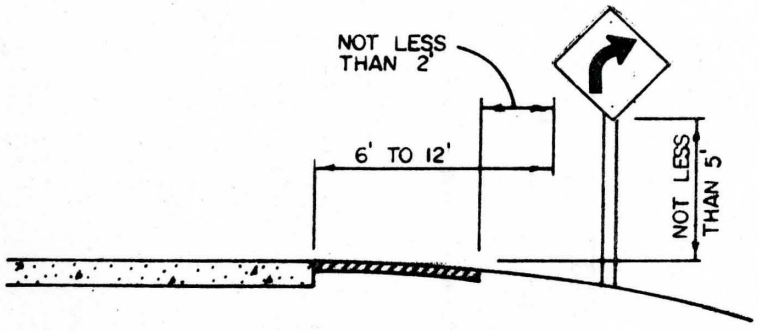
SUPPLEMENTS TO STOP SIGN

SELECTED SIGNING
FIGURE 9B

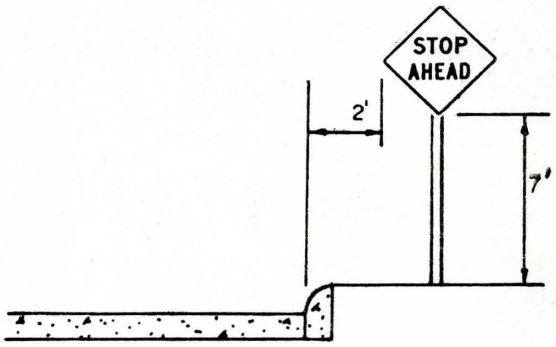
PLACEMENT OF SIGNING
FIGURE 10



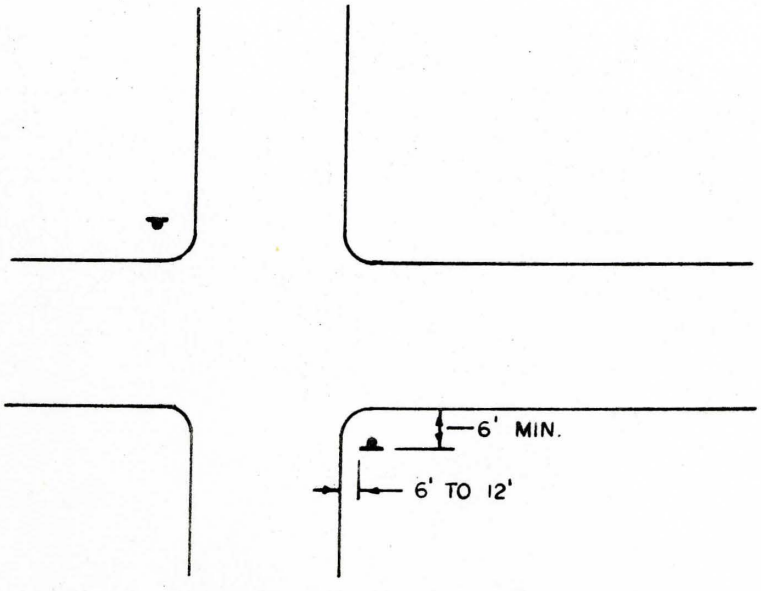
RURAL SECTION



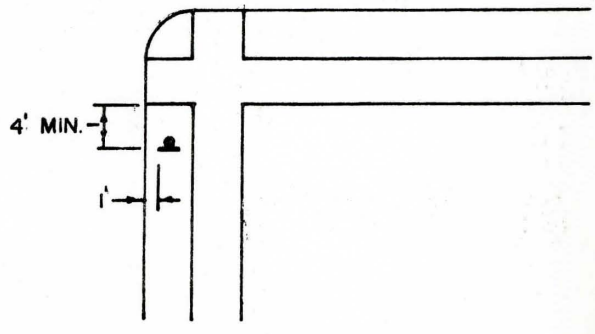
RURAL SECTION



URBAN SECTION



RURAL INTERSECTION



URBAN INTERSECTION

Controls at school crossings are discussed in groups according to the school with which they are associated.

Broad Street School. Two crossings are located near this grade school. The one closest to the school is located on Broad Street just north of Valley Street. To bring this location into conformance with the MUTCD, the diamond warning sign north of the school on Broad Street should be removed. Two pairs of "School Advance" and "School Crossing" signs (see FIGURE 9) 30 inches by 30 inches in size should be installed as indicated in FIGURE 11.

The portable stop sign used at this crossing is non-conforming (Section 2B-5). It is recommended that the use of this device be discontinued.

The crossing at Center Street and Valley Avenue is in substantial conformance with the standards as it has the proper advance and crossing signing. The crossing controls are supplemented by an overhead flashing beacon flashing red to West Valley Avenue and flashing amber to Center Street. As Center Street carries S. H. 48 and the crossing is only one-quarter mile south of Ferguson Avenue and higher speed limits, its use is acceptable. The signal head should be yellow and the visors flat black for greater visibility, but this can be performed the next time painting is required.

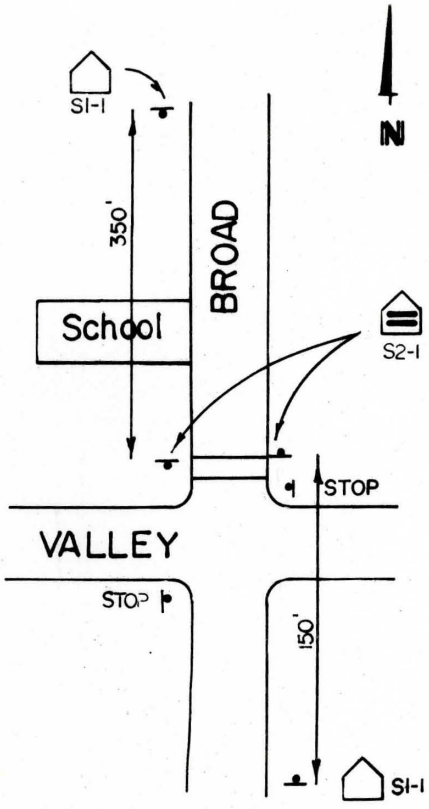
During several field trips it was noted that the beacon was not flashing, but that solid red or amber indications were being displayed. Such a situation is confusing and hazardous. When the flashing unit is not working properly, it is recommended that the unit be turned off. Continued malfunction should warrant replacement of the flasher mechanism.

Lowell School. Three school crossings are located near Lowell School. Two are located near the school, one on Valley and one on Lowell Avenue. Presently, they are marked with diamond-shaped "School Crossing" signs. These should be removed and replaced with the newer signs as in FIGURE 12.

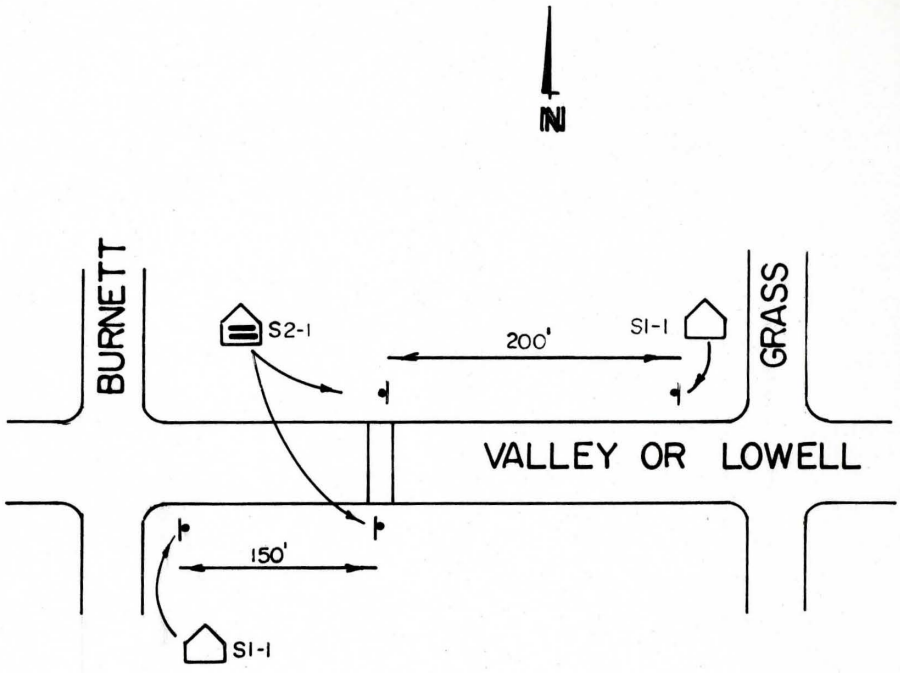
The other crossing is located at Sheridan and Barnett on the east leg of Sheridan. It is marked appropriately with the proper school advance and school crossing signing. It is recommended that the location of the advance signing be adjusted to insure the 150 foot minimum spacing between the school advance sign and the school crossing sign.

It is further recommended that the use of the portable stop sign unit be ceased as it is non-conforming and causes substantial delays to traffic on a heavily-travelled street. School officials indicated that about a half-dozen children regularly cross at this point. This location does not meet the requirements of Section 4C-5 for a signalized pedestrian crosswalk. A consideration of the requirements of Section 4C-6 for signalization as a regular school crossing was made. A review of traffic data, a field check made during hours of crossing utilization, and the small number of children using the crossing indicates signalized control is not warranted in this case.

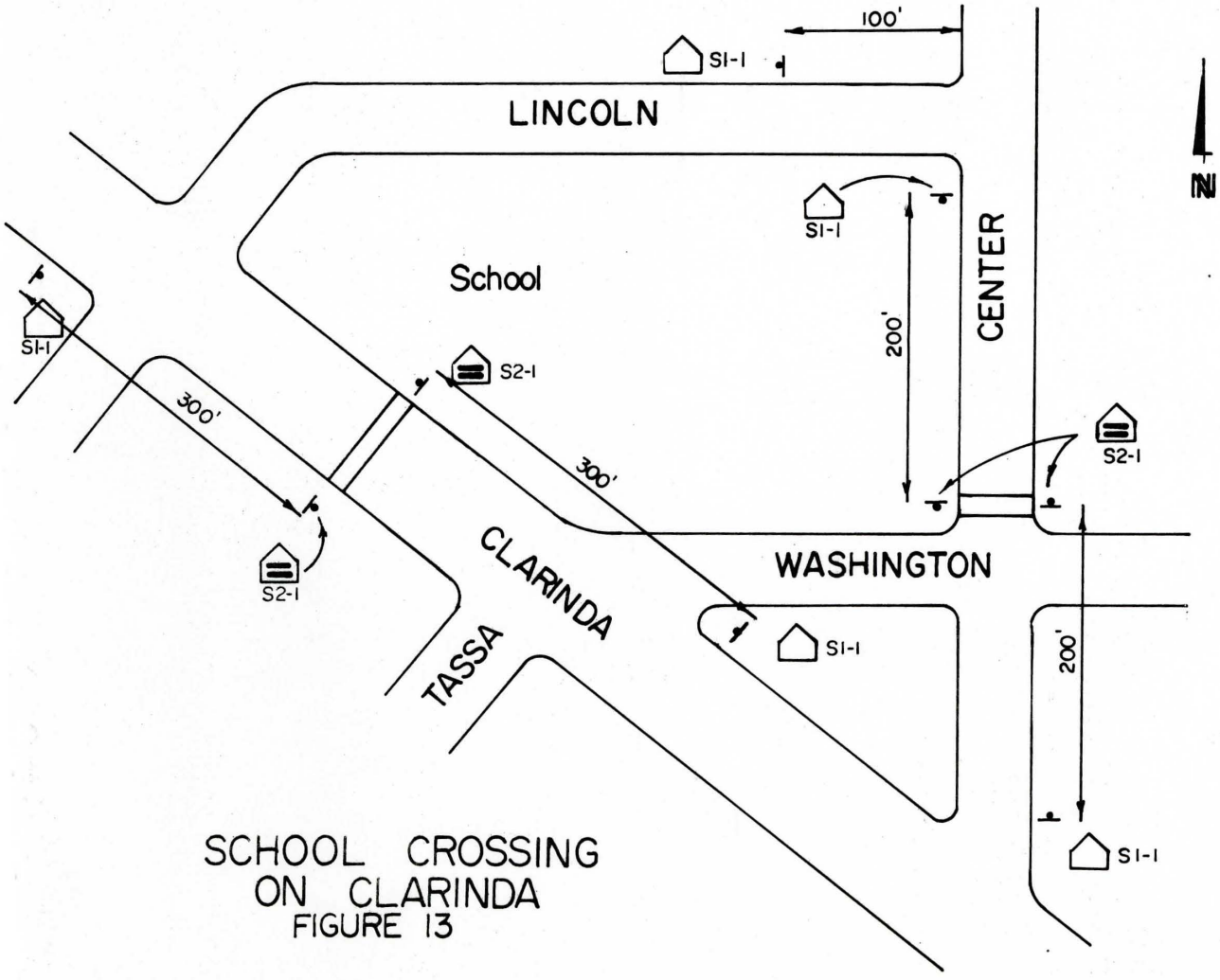
Central School. Two crossings are located adjacent to Central School. The mid-block crossing on Clarinda in front of the school is marked by a "Slow - School" sign on each approach, and by a portable stop sign unit set in the street during hours of usage by children coming from or going to school. These signs and portable stop sign unit should be removed, and the crossing controlled as shown in FIGURE 13.



SCHOOL CROSSING AT
VALLEY & BROAD
FIGURE 11



SCHOOL CROSSINGS ON
VALLEY & LOWELL
FIGURE 12



SCHOOL CROSSING
ON CLARINDA
FIGURE 13

The crossing on Center Street is marked from the north by a "Slow - School" sign and is unsigned from the south. A treatment similar to that on Clarinda Avenue is recommended and is also shown in FIGURE 13.

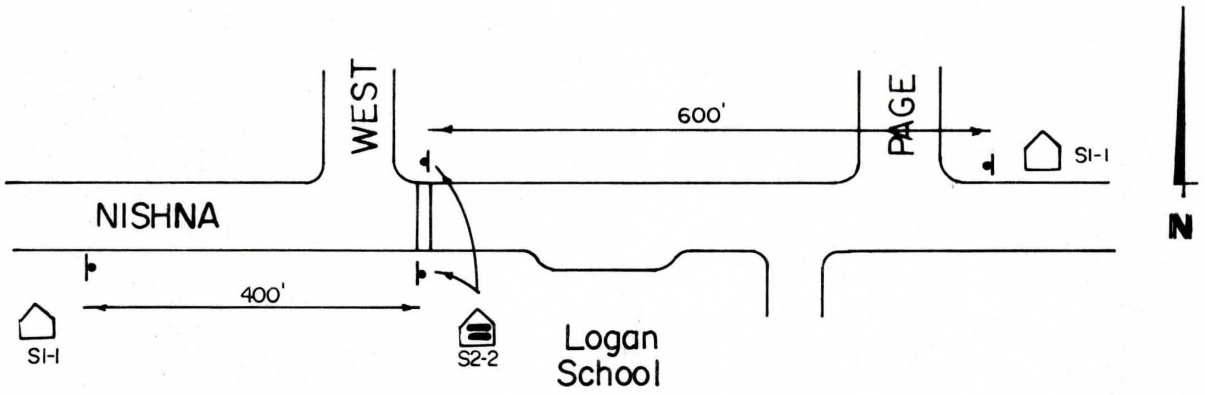
Logan School. Two crossings are associated with this elementary school. The first is nearly opposite the school on Nishna Road. It is marked with "Slow - School" signs on the approaches to the crossing. For conformance, it is recommended these be removed and replaced as shown in FIGURE 14.

The crossing on the south leg of Center Street and Nishna Road has no advance signing. A portable stop sign is placed in the crosswalk at the appropriate times. The recommendation is made that this crossing be signed as shown in FIGURE 15, and that use of the portable stop sign unit be discontinued.

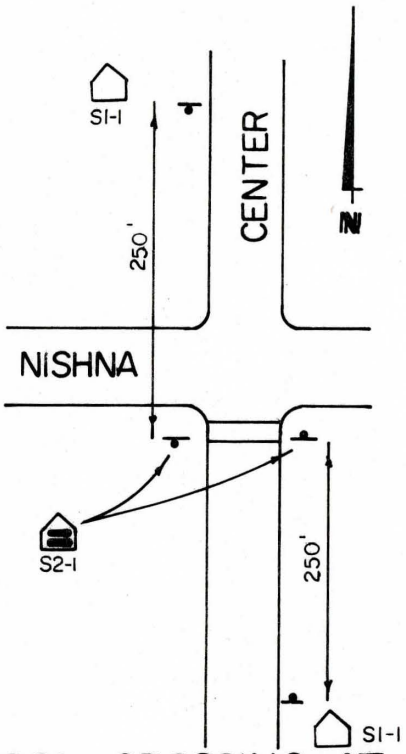
A third crossing is located at Anna Crose Highway and Mitchell Street. Diamond signs reading "School X-ing" are located east and west of Mitchell Street. This is the only crossing point at which the posted speed limit is greater than 25 mph. Here the limit is 35 mph. A janitor had been manning the crossing but this was discontinued.

It is recommended the diamond warning signs be removed and the crossing marked as shown in FIGURE 16. The signing should be the larger 36-inch size due to the rural type road cross-section. A painted crosswalk is also required at this location.

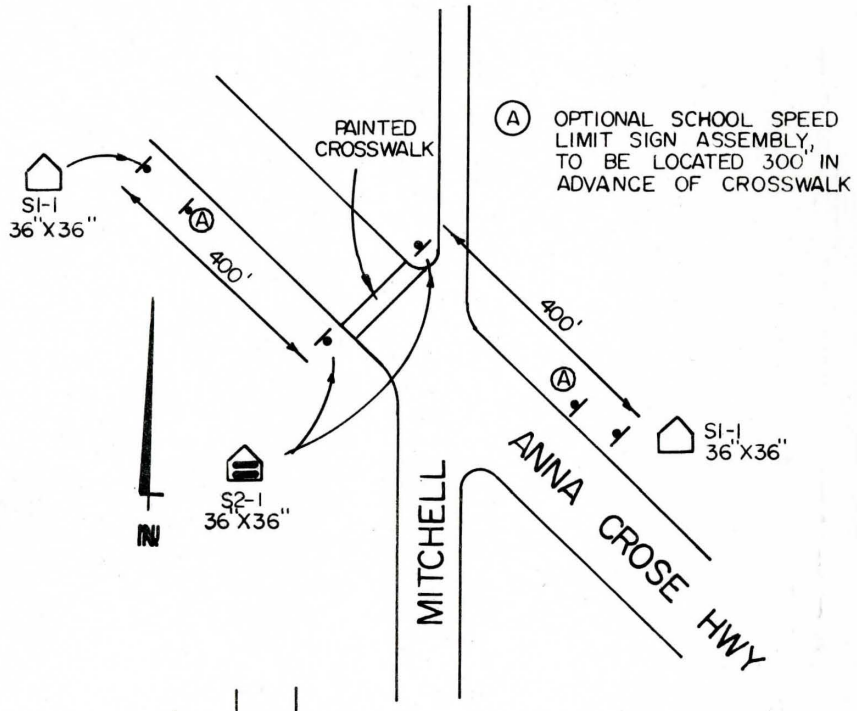
Since S. H. 2 was rerouted to the south, traffic at this location has not been a critical factor. Sufficient gaps in traffic are available for safe crossing. If local authorities feel the situation requires further treatment, a school speed limit sign assembly (see FIGURE 9) may be utilized.



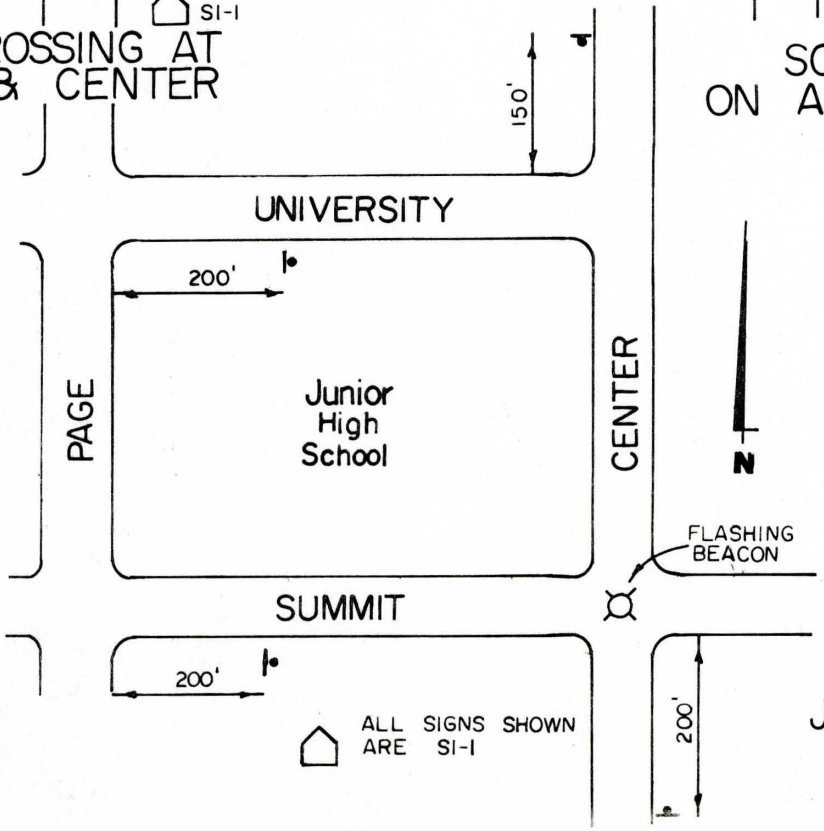
SCHOOL CROSSING AT
WEST & NISHNA
FIGURE 14



SCHOOL CROSSING AT
NISHNA & CENTER
FIGURE 15



SCHOOL CROSSING
ON ANNA CROSE HWY
FIGURE 16



JUNIOR HIGH AREA
FIGURE 17

Junior High School. Two "Slow - School" signs are located in advance of the junior high. In addition, a flashing beacon is located at Center and Summit, presumably to warn motorists of children in the area. As the children are older, and traffic on Center Street is not heavy, a marked crosswalk does not seem necessary.

It is recommended that the two signs mentioned above be removed and the area be signed as shown in FIGURE 17.

High School. The high school has no pedestrian crossings in the vicinity, and none appear necessary. It is recommended that the "Slow - School" signs be replaced by School Advance signs. Additionally, it is recommended that the two diamond "School" signs on Anna Crose Highway to the east and west of Mustang Drive be removed, as pedestrian traffic in this area is minimal and this road is no longer a state highway. If desired, two school advance signs (SI-I) may be used in place of the non-conforming diamond-shaped signs.

Other Related Signing. In addition to the above signing changes, other sign removals are recommended. These include "Slow - School" signs at Nishna Road and East Street, on Southview Boulevard east of Center Street, and on both Page and West Streets south of Summit Avenue. These four signs are non-conforming, and are either far removed from the school or not located on a street adjacent to a school. Such oversigning can actually lead to driver disregard of their intended meaning.

Also, thirteen signs with the legend "Slow - Children (Local Bank)" are scattered across the City, usually near crosswalks. The advertising on these signs and their design is non-conforming. Those eight near crosswalks are

redundant with existing or recommended crosswalk signing. It is recommended these signs be removed, as well as an unnecessary "School Zone" sign at Church Street and Mentyer Ct. (See FIGURE 7 for location).

Two signs reading "Slow - Children" are located in the City, both on Crescent Street near Lincoln Park. Such signs are not in conformance with the MUTCD. An acceptable sign would be a diamond-shaped warning sign reading "Playground" or "Play Area" (Section 2C-40, as interpreted in Official Rulings on Requests, Vol. 5, June 1974). However, as use of these signs is sparse, updating is recommended to be performed when the signs require replacement due to age or damage.

General Guidelines. There are a number of other general guidelines and recommendations pertaining to school crossings which are discussed as follows.

A general recommendation for all crossings was the discontinuation of the use of portable stop sign devices. Section 2B-5 of the MUTCD states that "portable or part-time STOP signs shall not be used for other than emergency purposes." A number of reasons support this directive. They are susceptible to theft, or improper use by unauthorized persons, and they do not present a permanent, standard type of control because of their intermittent use, and out-of-the-ordinary placement and usage.

As far as their use as a speed control for traffic to permit safe passage of children is concerned, this is not valid on two counts. The first is based on the directive in Section 2B-5 that "STOP signs should not be used for speed control." This is a responsibility of the local law enforcement officials. All

crossings discussed are located in 25 mph speed zones, with the sole exception of the crossing on Anna Crose Highway. This speed is satisfactory for crossings. It is recommended that standard 25 mph speed limit signs be installed on approaches to all crossings, if not already present, to remind motorists of the proper operating speed. The exception to this is the crossing on Anna Crose Highway where the present 35 mph speed limit is acceptable with the recommended new signing at that location.

The second reason for removal of the portable stop signs is based on the practical experience at the crossings. It was noted that children do not cross upon a car or cars stopping at the crosswalk. Instead they cross after the cars have cleared the crossing. Consequently, the portable signs cause unnecessary delay to motorists, which is particularly annoying when no children are near the crosswalk.

The purpose of crossing patrols is "to control children, not traffic" (Section 7E-11). Thus, the removal of the portable stop sign units should not pose any operational problems at the crossings. A psychological objection may arise in that the cars would not be required to stop. However, observance of the speed limit (either voluntary or enforced), the education of children as to proper crossing techniques, and proper signing and marking will work together to provide a safely operating school crossing. (See the APPENDIX for an additional statement on this subject).

In regard to visibility of the new signing discussed above, it is recommended that the signing be installed as shown in FIGURE 10 at the beginning of this part. It is further recommended that the crosswalk striping be maintained

for proper visibility and that the stripes be at least 6 inches in width, spaced not less than 6 feet apart (Section 3B-15). It is further suggested that parking be prohibited 100 feet in advance of crossings and at least 50 feet past crossings for good visibility. In some cases, this will conform to an already existing situation, or existing field conditions which will readily allow such implementation. In other cases, some objection will likely be raised. The intent is to maximize the visibility of the child and motorist to each other.

Railroad Crossings

The priority concern with railroad crossings is the upgrading of the crossing pavement conditions. It is recommended that responsibility between the City and the respective railroads for maintenance of the crossing surfaces be negotiated or determined. The crossings should be upgraded to provide a suitable driving surface, and properly maintained by the responsible party.

Although speed limits are low, main line crossings are readily visible and marked with crossbucks, and train traffic is not heavy, advance railroad warning signs (W10-1) should be installed at crossings without them as follows:

1. On Valley Avenue, 100 feet in advance of crossing on both approaches.
2. On Thomas Ave., 100 feet in advance of crossing on both approaches.
3. On Argus Road, 150 feet in advance of crossing on both approaches.
4. On Ferguson Ave. at Wabash tracks, 100 feet in advance of crossing on both approaches.
5. On Ferguson Ave. at Burlington Northern tracks, 150 feet in advance of crossing on both approaches, and 100 feet south on Sycamore St.

At all locations, the crossbucks should also have the auxiliary sign specifying the number of tracks (R15-2) displayed below them. (See FIGURE 9).

The pavement markings on the U.S. 59 grade crossing should be maintained for good legibility. In accordance with the criteria of the MUTCD, pavement markings do not appear necessary at the other grade crossings, due to pavement conditions, low vehicular speeds, light train traffic, geometric constraints, and the presence or recommendation for installation of railroad advance warning signs.

The railroad advance warning sign on Center Street (S. H. 48) north of Ferguson Avenue in the soutbound direction is obscured somewhat by the back side of a no-passing pennant-shaped sign. Either one or both of these signs should be moved laterally enough to provide good visibility, but without overstepping sign placement guidelines.

Unsignalized Intersection Controls

A review of the intersection controlled only by signing as described in PART III and illustrated in FIGURE 6 was performed. The discussion of the observations and conclusions regarding these traffic controls is presented in two categories.

The first is the recommended intersection control signing changes, improvements, and updates on a city-wide basis. This section discusses overall guidelines and principles which were considered in evaluating this signing.

The second part addresses specific intersections where additional discussion of special geometrics or conditions is necessary, and where improvement sketches are necessary to clearly portray recommendations.

Discussion of intersections identified as having significant accident experience are treated separately in a subsequent part of this report.

City-wide Intersection Signing. Three basic objectives of intersection controls are: (1) Provision of adequate intersection capacity, (2) Reduction

and prevention of accidents, and (3) Designation and protection of major streets.

In reviewing the intersection signing currently in use, a number of accepted guidelines and principles were considered towards the development of a logical scheme of intersection signing consistent with the above objectives. The considerations are as follows: (1) Sight distance, (2) Street classification (arterial, collector, local), (3) Speed limits, (4) Intersection geometry, (5) Relative traffic volumes, (6) Turning demands, (7) Use of yield to control only minor street, (8) Use of yield to control only one street, (9) No mixing of yield and stop signs at an intersection, (10) Conformance to the MUTCD, and (11) Accident experience.

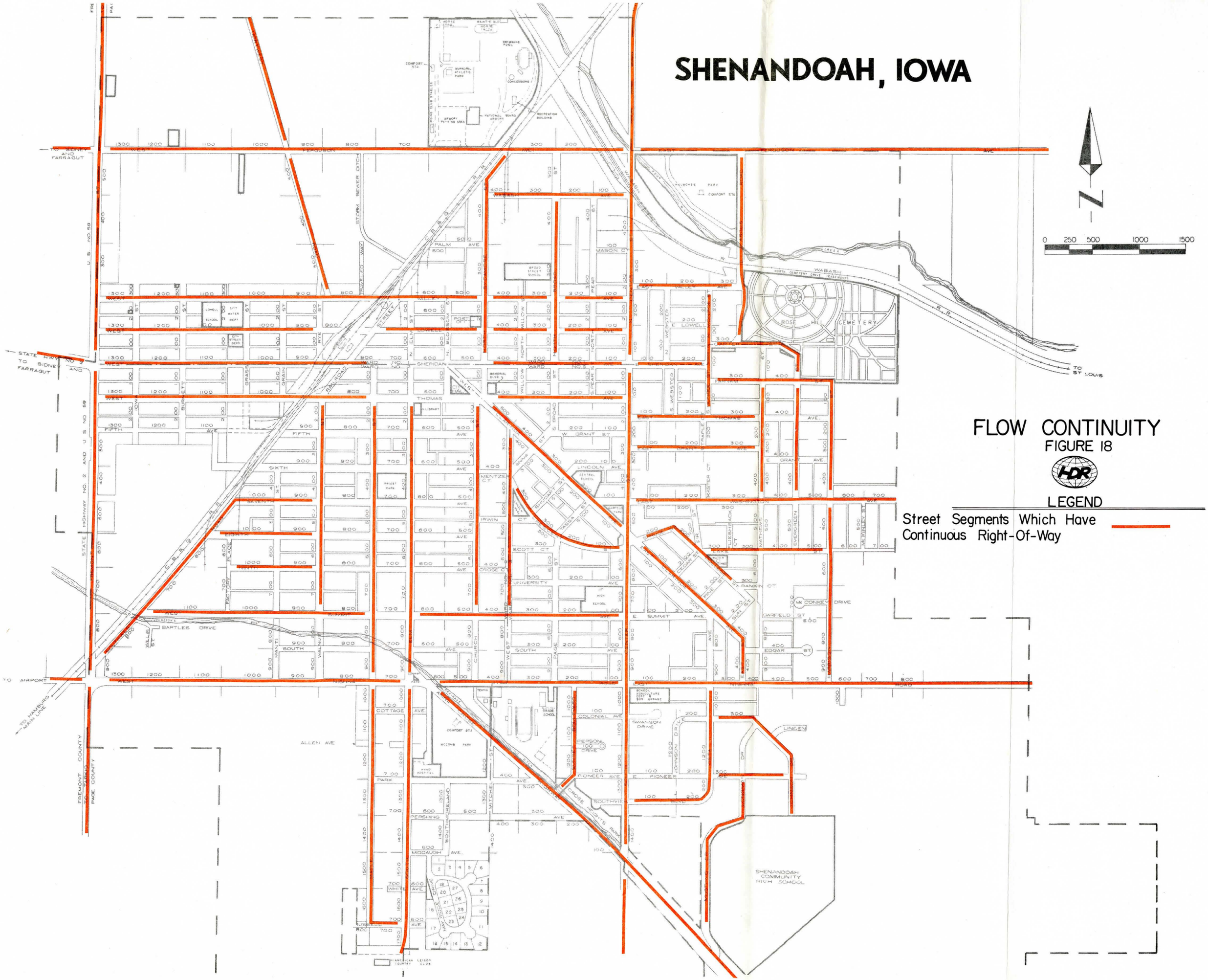
The existing intersection controls were reviewed to determine the effect they had on city-wide accessibility. The results are shown in FIGURE 18 which depicts those street segments which are assigned continuous right-of-way according to the existing intersection controls.

It is seen that the assignment of right-of-way is for the most part logical and sensible. Direct access to and from the CBD, the major traffic generator, is possible from all parts of the city with only a few interruptions of flow. The major streets as depicted in FIGURE 2 are assigned the right-of-way in conformance with their function as principal traffic arteries.

Keeping in mind the general considerations in the preceding discussion, intersection controls were examined to see if they were warranted, were in conformance with the MUTCD with respect to usage and location, and generally provided adequate and proper flow of traffic.

This examination resulted in a number of recommended intersection signing changes, which are graphically displayed in FIGURE 19. Modifications

SHENANDOAH, IOWA



FLOW CONTINUITY

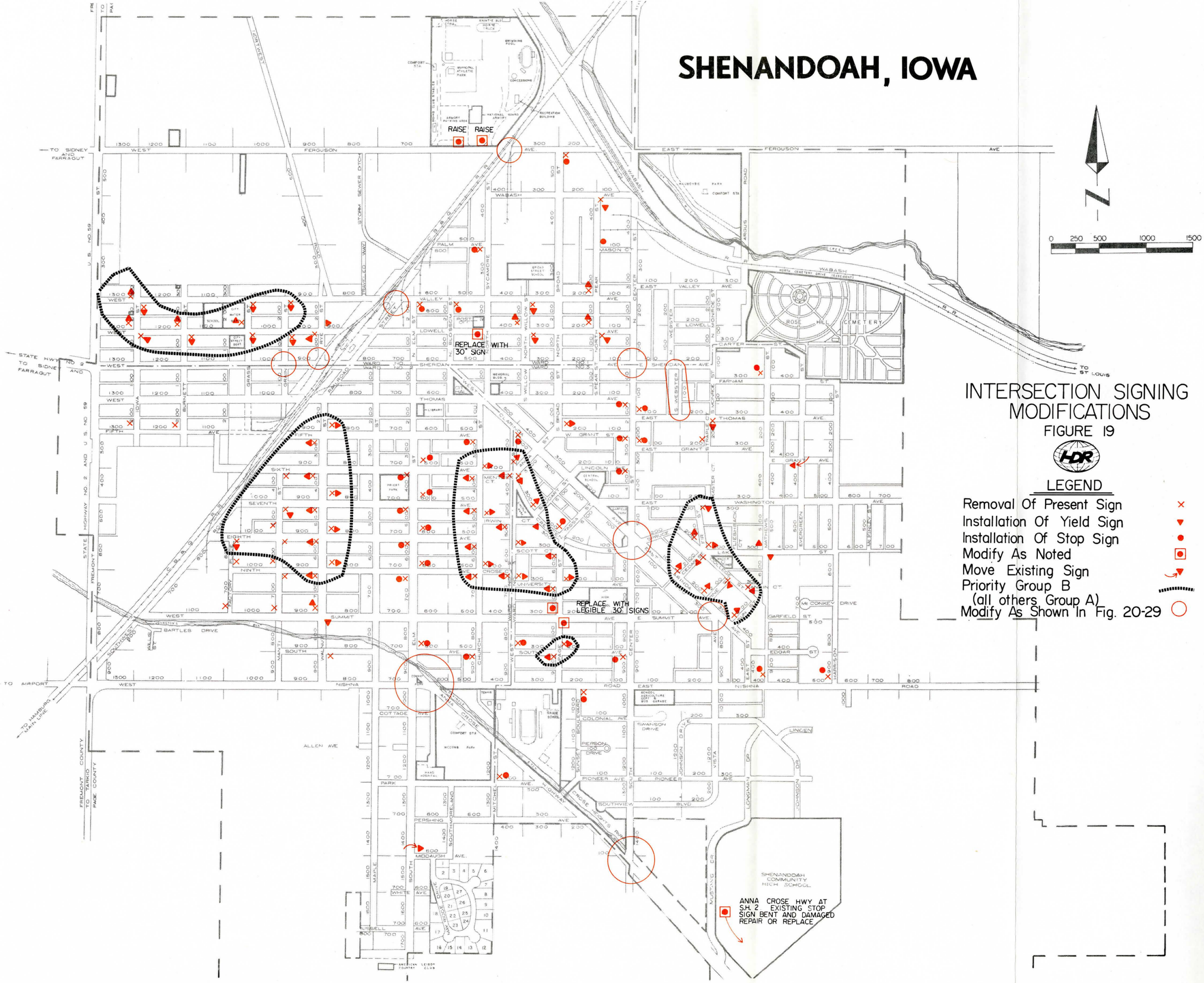
FIGURE 18

HDR

LEGEND

Street Segments Which Have Continuous Right-Of-Way

SHENANDOAH, IOWA



INTERSECTION SIGNING MODIFICATIONS

FIGURE 19

HDR

LEGEND

- Removal Of Present Sign ×
- Installation Of Yield Sign ▼
- Installation Of Stop Sign ●
- Modify As Noted ◉
- Move Existing Sign ↷
- Priority Group B (all others Group A) ┈┈
- Modify As Shown In Fig. 20-29 ○

typically included simple updating of signs, changing from yield to stop signs, changes in sign placement, and installation of additional signs at certain locations.

The basic through travel patterns were retained as described above. Yield signs on Elm Street and Center Street are replaced by stop signs to emphasize their role as major streets. Only a few signs were involved on Center Street as most were already stop signs. The stop signs are specified on Elm Street to clearly mark it as a through street in an area of regular rectangular-grid streets.

Clarinda Avenue is also designated as a secondary street, but its width and diagonal orientation help to specify its relative importance. Most other signing modifications involve updating for conformance.

The recommended intersection signing changes are divided into two groups. Group A includes those locations which should receive prompt implementation. Those in Group B are less urgent and can be implemented at a later date, depending on the eventual source of funding for their installation.

At other locations, as indicated, further discussion and sketches are necessary to clearly specify improvements. At none of these locations was accident involvement a significant consideration. Those intersections with high occurrence of accidents are considered later in this part.

Sheridan Avenue at Rye Street and at Grain Street. At both of these locations, a stop sign on the minor street is located an excessive distance from Sheridan Avenue. At Sheridan and Rye, the intersection is poorly defined because both the northwest and northeast corners are continuous drives, and because a railroad spur runs through the intersection.

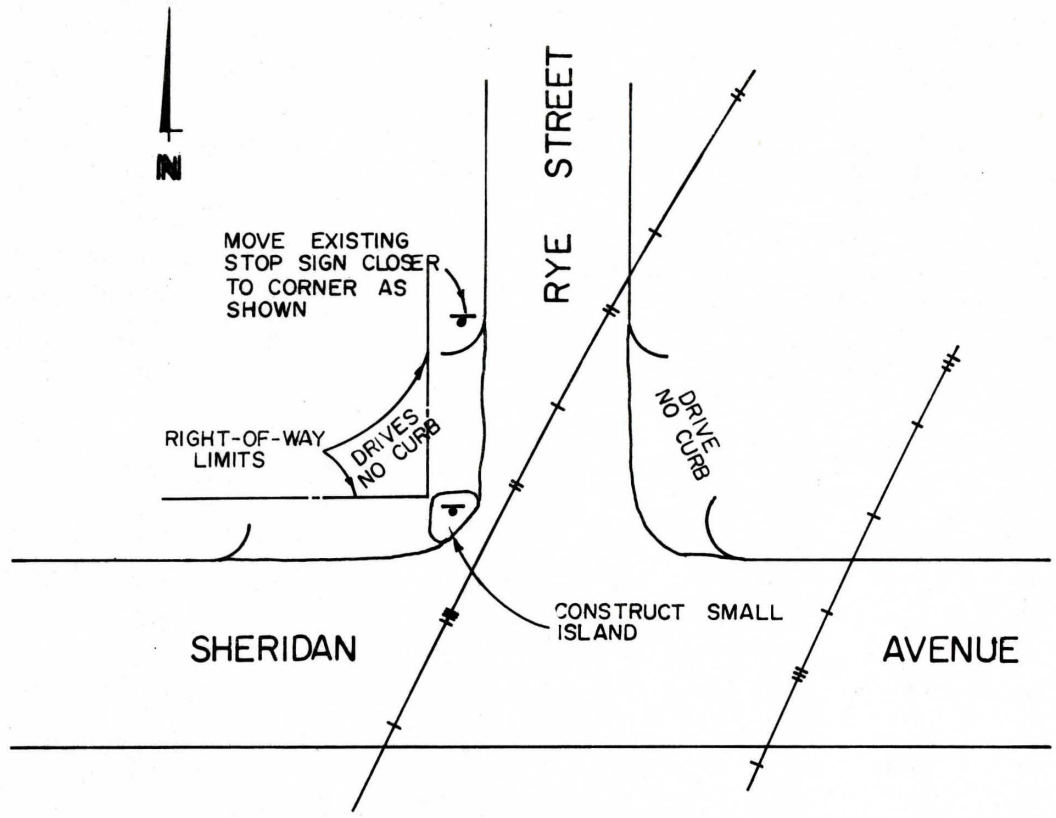
The southeast corner of Sheridan and Grain likewise has a continuous drive which resulted in the stop sign on the south leg being posted some forty feet in advance of Sheridan Street.

Neither intersection has a significant accident history, nor is side street traffic heavy in either case. For these locations, it is recommended a small island be constructed, with asphalt curbing or preferably concrete curbing and that the portions facing streets be painted yellow for good visibility. These islands will better define the actual intersection and provide a protected area for proper placement of the stop sign. These recommended improvements are summarized in FIGURES 20 and 21.

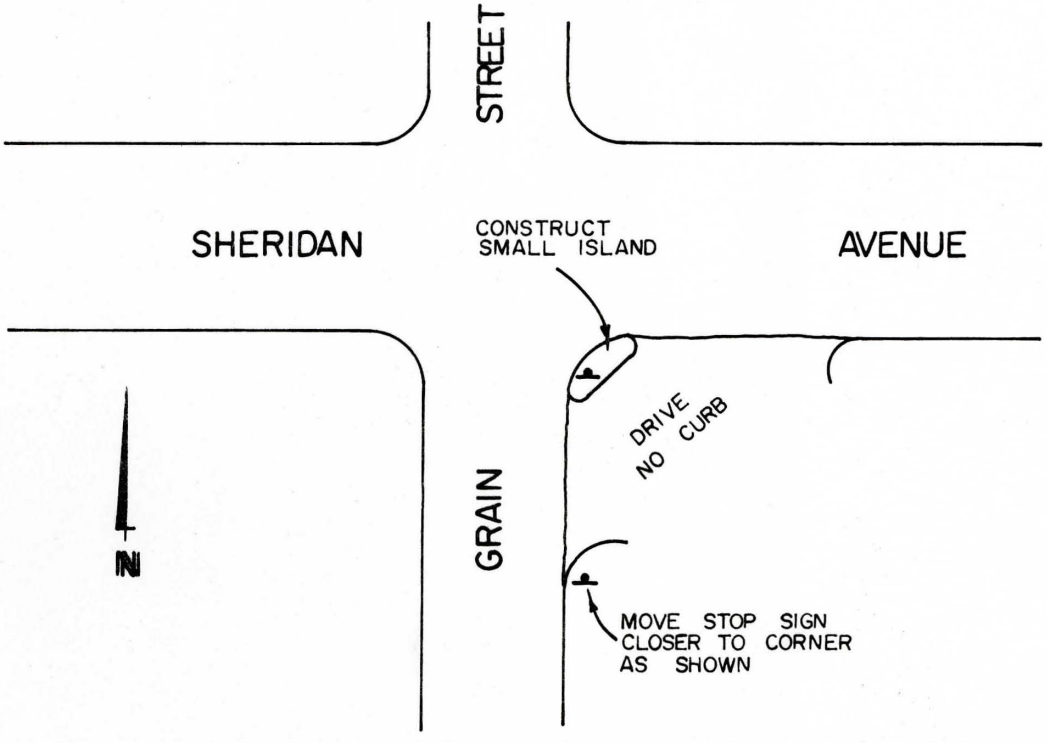
Railroad Street and Valley Avenue. This intersection is complicated by a rail spur, parked cars, an adjacent railroad crossing, two drives, and somewhat restricted sight distances. The geometrics and signing should be modified as shown in FIGURE 22. No additional measures are warranted as no accidents were recorded in the study period.

Sycamore Street and Ferguson Avenue. This skewed intersection is currently controlled by a non-conforming yield sign on the far side of the intersection. Ferguson Ave. is not curbed, and heading north on Sycamore, the upcoming T-intersection is not readily apparent. It is recommended the intersection signing be modified as in FIGURE 23. It is suggested that the southeast curb be modified to better define the intersection and provide a better placement of the recommended stop sign. Also, a double-head arrow is recommended to clearly indicate the end of Sycamore Street.

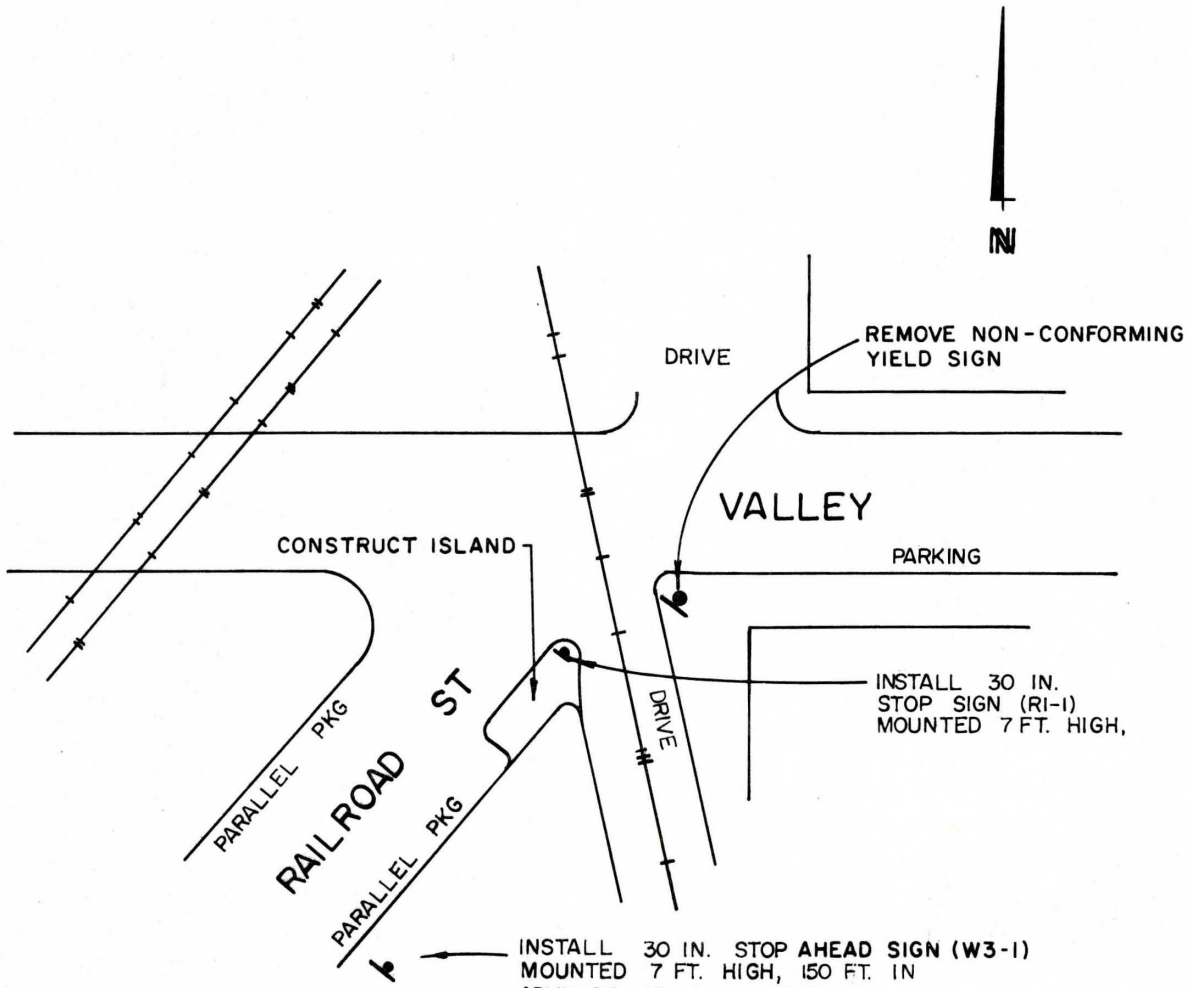
Webster Street at Sheridan and Thomas Avenues. Webster Street is



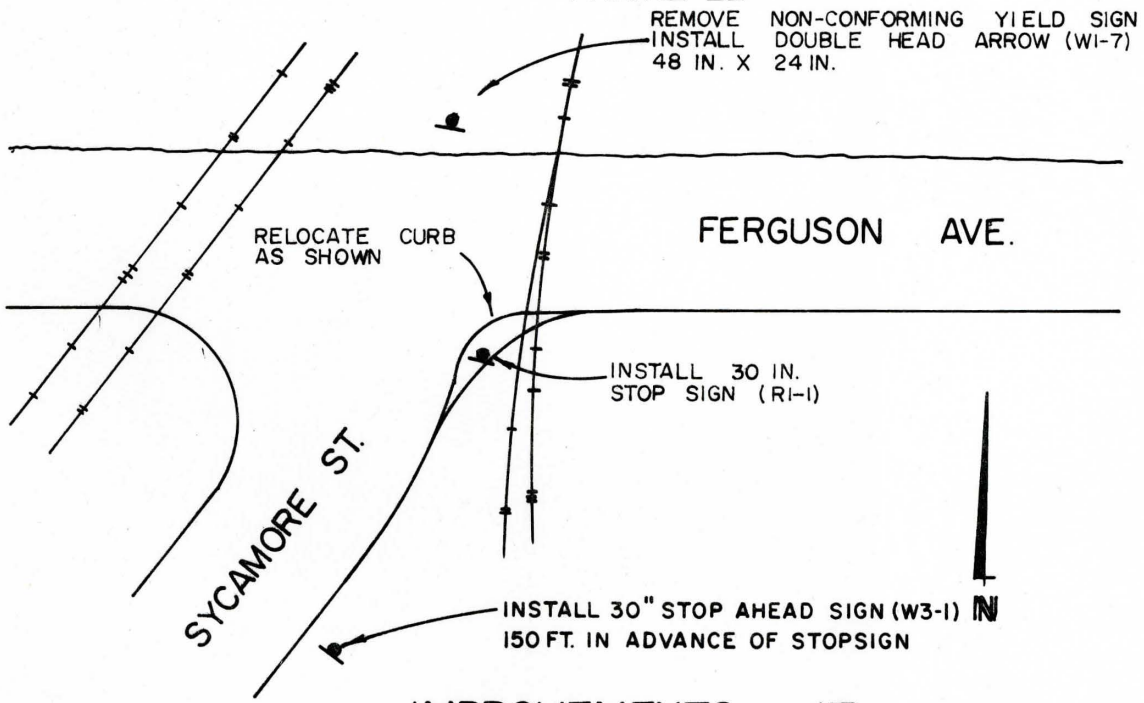
IMPROVEMENTS AT SHERIDAN & RYE
FIGURE 20



IMPROVEMENTS AT SHERIDAN & GRAIN
FIGURE 21



IMPROVEMENTS AT
RAILROAD & VALLEY
FIGURE 22



IMPROVEMENTS AT
SYCAMORE & FERGUSON
FIGURE 23

narrow, and is properly signed as one-way northbound. However, the recommendation is made that the signing be modified as shown in FIGURE 24 for improved clarity and conformance with standards.

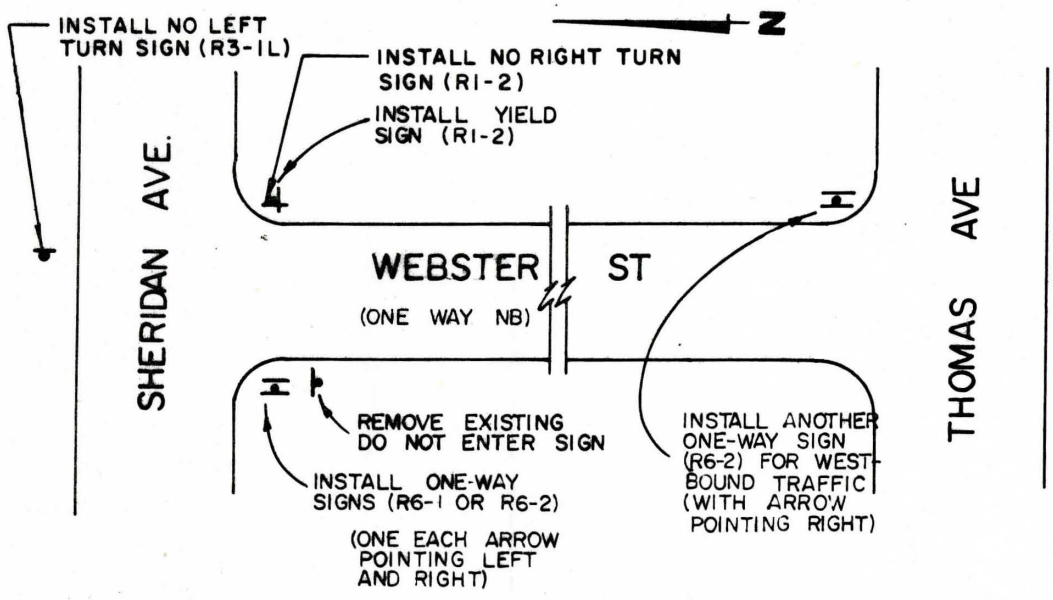
Center Street and Anna Crose Highway. This intersection has good sight distances, but is located on a skew. Also the intersection is not well-defined and is expansive in appearance to the motorist. This can contribute to a driver's loss of his sense of location within the intersection. Accidents at this location have been minimal.

It is recommended that the intersection be modified as shown in FIGURE 25. Stop Ahead signs should be placed as shown. It is doubtful that painted stop lines are practical due to the surfacing of the approaches. However, due to the minimal accident experience at this location, more extensive modifications are not warranted at this time.

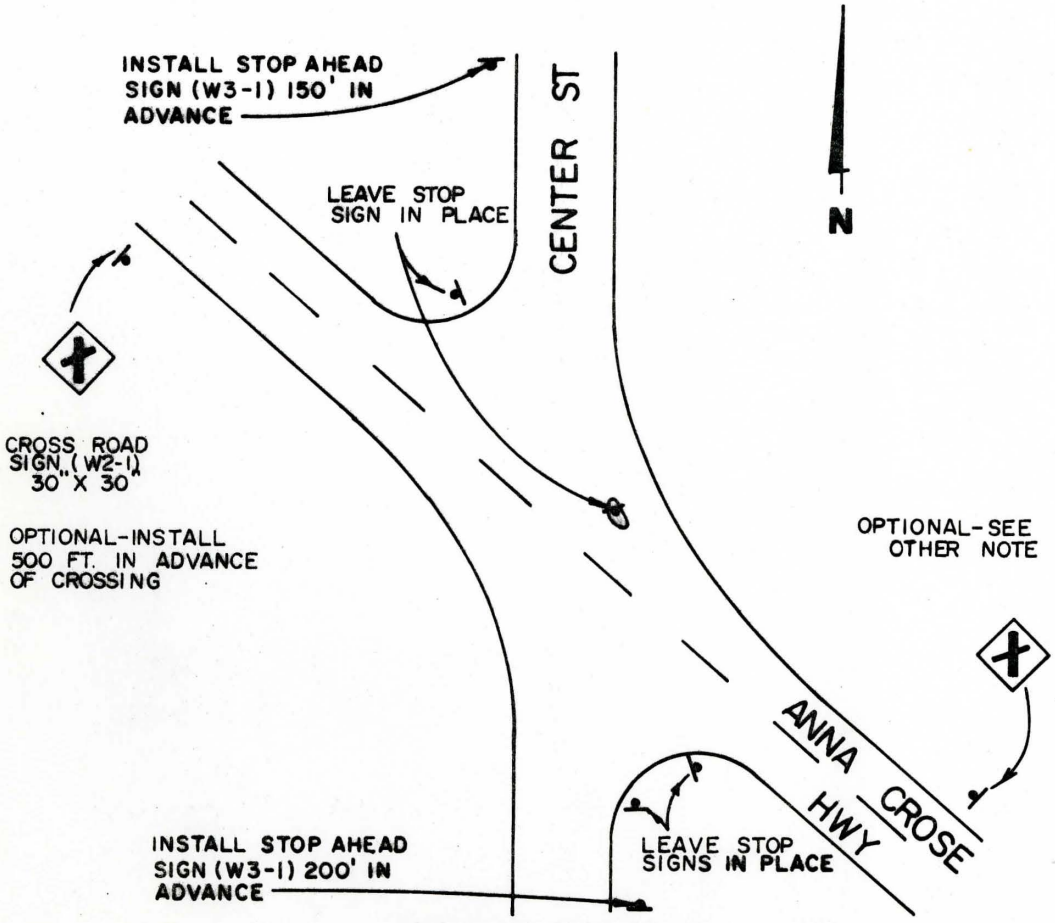
Clarinda, Vista, and Summit Avenues. The only recommended improvement is removal of the yield sign on the northwest corner, whose placement and legend are non-conforming. In addition, a supplemental sign reading "Not All Traffic Stops" (See FIGURE 9) should be installed below the stop signs on Vista and Summit (FIGURE 26).

As traffic volumes increase, accident occurrence may increase due to the unusual geometrics and traffic controls. At such time more extensive measures would be required to insure the safe flow of traffic at this location.

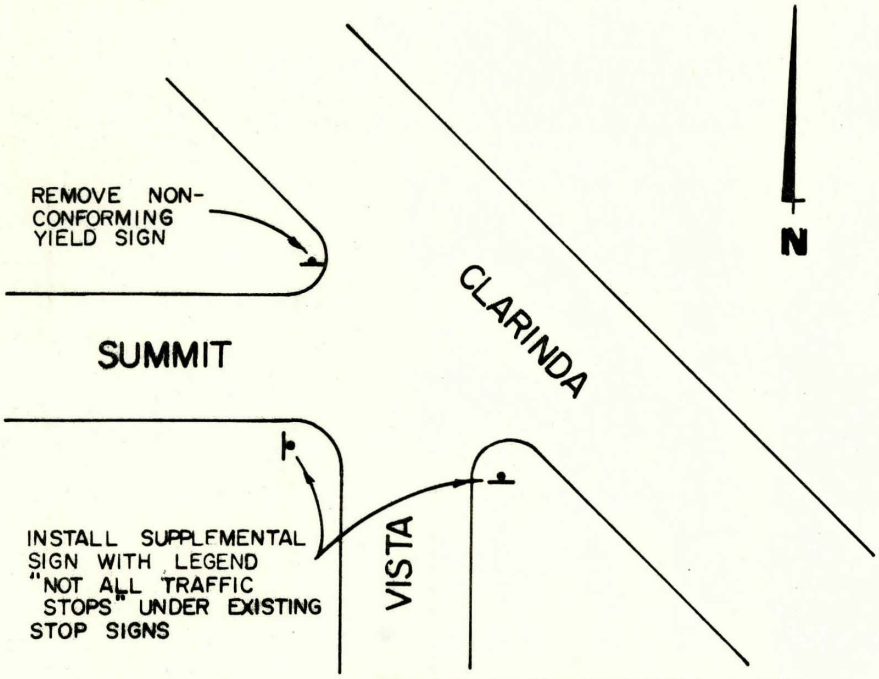
Nishna Road, Elm Street, and Anna Crose Highway. This intersection has diminished in importance and in traffic since S. H. 2 was rerouted to the south. Over time, however, as Shenandoah develops to the southeast, traffic can be expected to increase. At the present time, only an updating of signing and



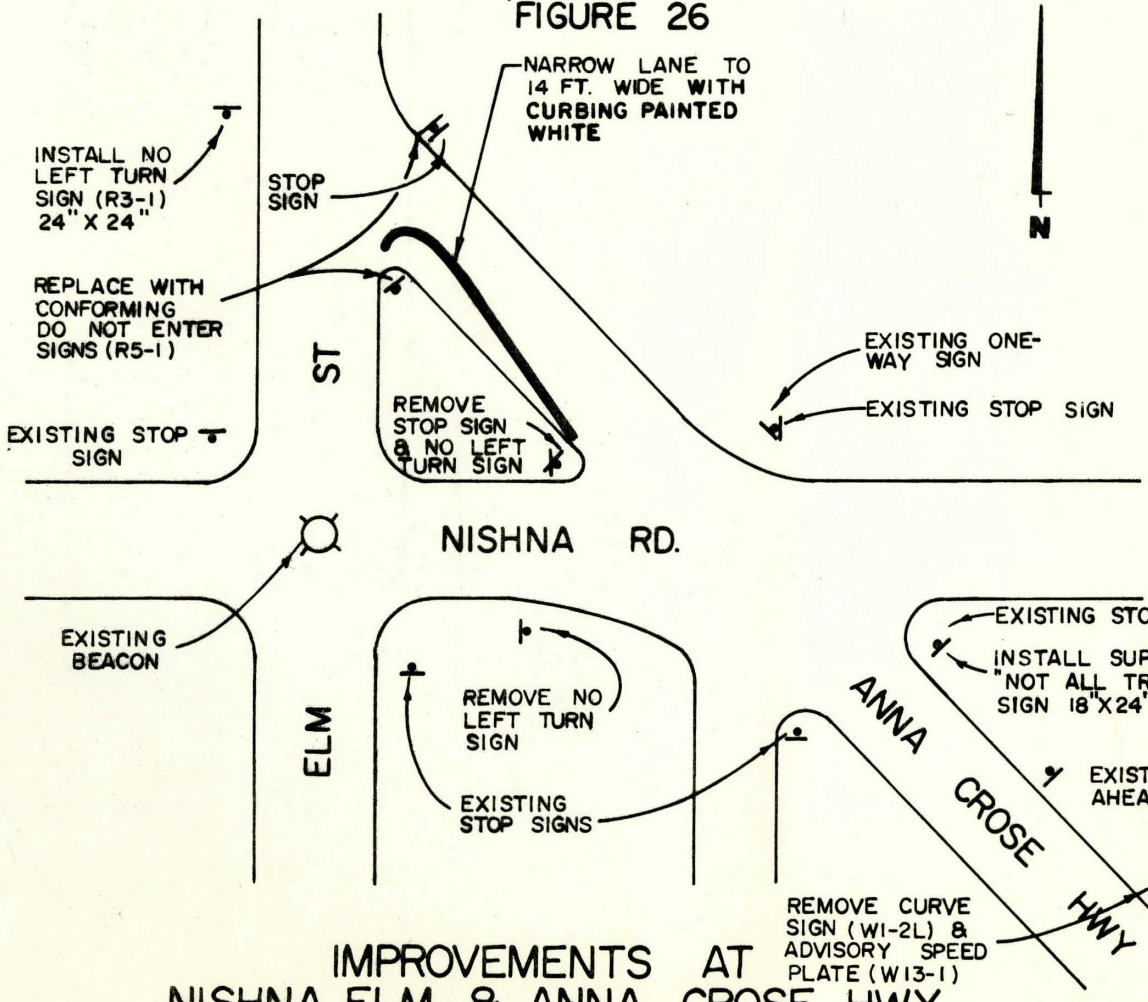
IMPROVEMENTS ON
WEBSTER ST.
FIGURE 24



IMPROVEMENTS AT
CENTER ST. & ANNA CROSE HWY
FIGURE 25



IMPROVEMENTS AT CLARINDA, VISTA & SUMMIT
FIGURE 26



IMPROVEMENTS AT NISHNA, ELM, & ANNA CROSE HWY
FIGURE 27

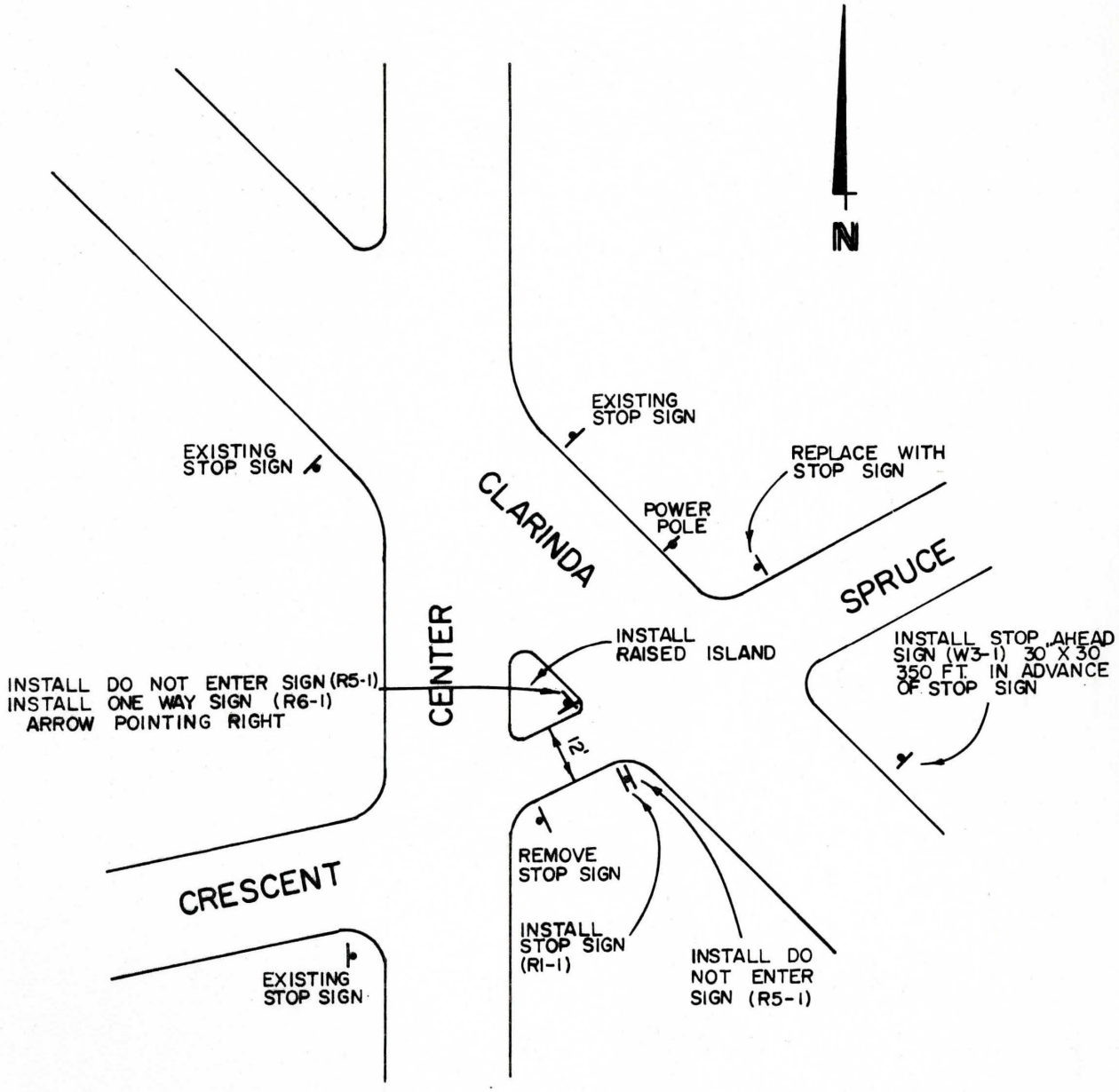
slight physical modification are required. As shown in FIGURE 27, it is recommended that signing changes be made as indicated, and that the one-way turning lane be narrowed and delineated. The flashing beacon can be retained, but should be painted yellow with flat black visors the next time painting is needed. Existing right-of-way designations have not been changed, as the accident history is minimal and traffic demands are adequately served.

One other modification which should be considered is the moving of the hospital drive entrance further east on Anna Crose Highway, or the provision of a different access point off of Elm Street, so as to reduce the intersection conflicts. Also, the curve signs with 25 mph speed plates located in advance of the intersection on Nishna Rd. and Anna Crose Hwy. should be removed.

Specific control and geometric modifications that may be required at a future date will depend on the actual turning demands which prevail at that point in time.

Clarinda Avenue and Center Street. This is one of several multi-legged intersections in the City. The two major streets intersect at a 45 degree angle. In addition Crescent and Spruce streets intersect Center Street and Clarinda Avenue, respectively, to the south of the major intersection.

To better define the intersection, to simplify turning movements, and to lessen turning conflicts and unusual maneuvers, it is recommended this intersection be modified as shown in FIGURE 28. The major change is the placement of an island on the south side of the intersection and the creation of a one-way turning lane. This turning lane can be used by northbound Center Street or eastbound Crescent Street traffic to reach southeast-bound Clarinda or eastbound Spruce Street. The movement from Spruce to Crescent is not provided for in a direct manner, but the demand for this movement is very light.



IMPROVEMENTS AT
CENTER & CLARINDA
FIGURE 28

Signing changes are made as shown to mark the turning lane clearly. Spruce Street is controlled by a stop sign rather than yield. Also, a stop ahead sign is installed on Clarinda Avenue as visibility of the existing stop sign is obstructed southeast of Spruce Street by a power pole.

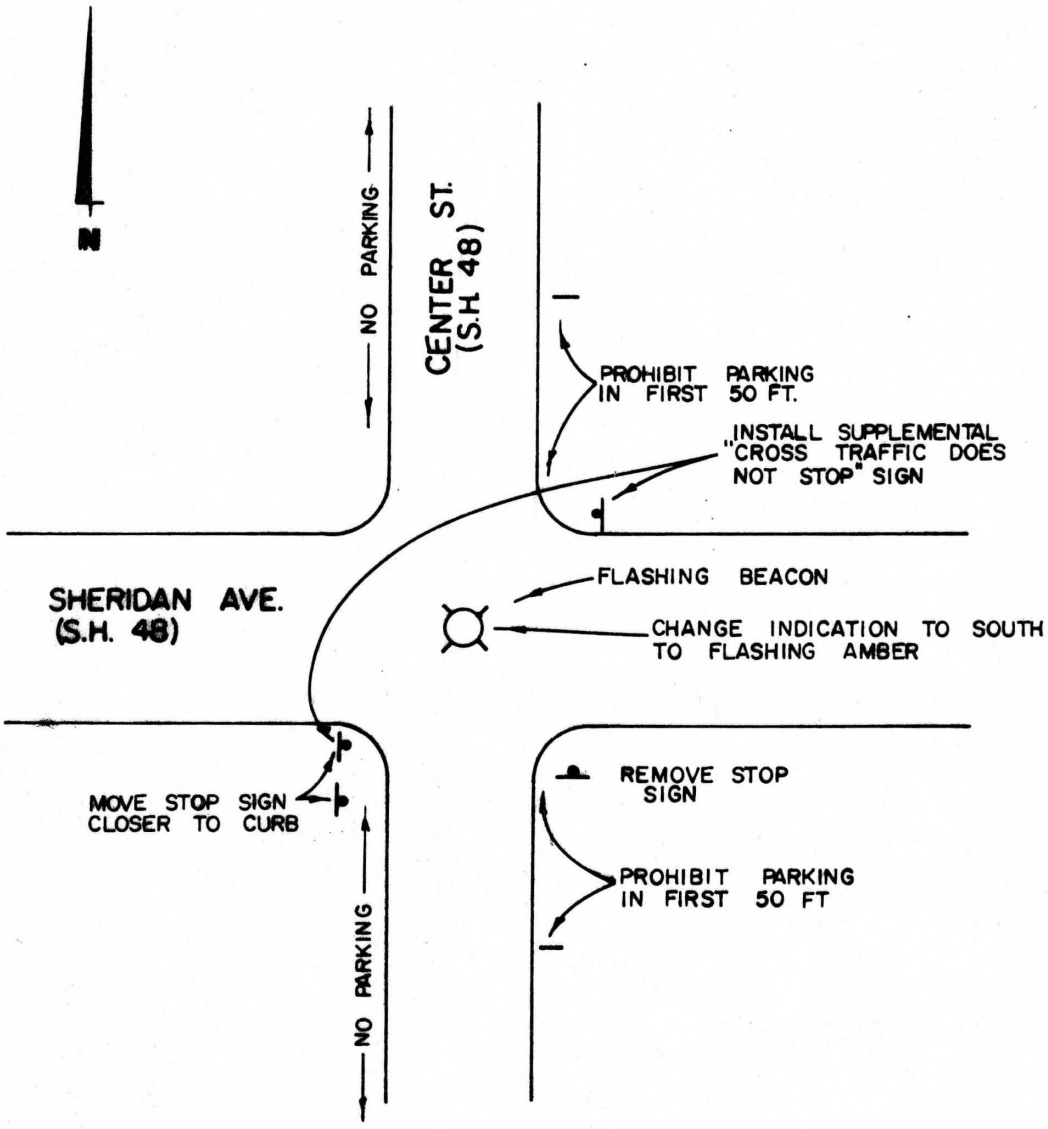
As accident involvement at this location is minimal, no further changes are suggested. If volumes increase substantially, then more substantial improvements may be required in the future.

Sheridan Avenue and Center Street. At this location, a beacon displays a flashing red indication to all approaches except the north which receives a flashing amber. Three stop signs emphasize the flashing red indications.

According to the MUTCD, an intersection control beacon must either flash yellow to one street, usually the major street, and red to the other, or red to all approaches (Section 4E-3). Other combinations can result in driver confusion, conflicting assignment of right-of-way, and eventually can contribute to an accident. Non-standard indications are hazardous as motorists on the various approaches do not know what traffic controls are displayed to the other approaches.

A review of traffic volumes indicates that the warrants for a four-way stop are not met. Accident experience amounted to two accidents in the past two years, with no repetitive accident pattern demonstrated.

As Center Street carries a greater amount of traffic, 60% of which is through in nature, and the 25 mph speed limit on both streets, it is recommended that the intersection be operated as a two-way stop with Center Street as the through street. This includes the signing and parking changes as shown in FIGURE 29.



IMPROVEMENTS AT
SHERIDAN & CENTER
FIGURE 29

The flashing beacon indication to the south requires change to amber, and parking on the east side of Center Street to the north and south of Center Street is prohibited to allow adequate sight distance on the east leg. The stop sign on the west leg needs to be located closer to the curb for improved visibility.

Supplemental "Cross Traffic Does Not Stop" signs mounted below the stop signs on Sheridan Avenue will clarify right-of-way assignment and help motorists adjust to the change in controls.

High Accident Locations

A review of the available accident records revealed several intersections and mid-block locations where accident involvement was high. This was defined to be a location where five or more accidents occurred in the period of a year, or additionally a location where a readily identifiable pattern of accidents could be discerned.

The downtown is defined to include the intersections and streets in the area bounded by Lowell Avenue on the north, Railroad Street on the west, Thomas Avenue on the south, and Willow Street on the east. Within this area which includes 17 intersections, ten intersections or their approaches were found to have significant accident experience. Most of these cases involved high accident involvement between intersections, rather that at intersections.

Seven intersections outside the downtown area were found to have an accident experience over the last two years significant enough to warrant review and discussion. These high-accident locations are considered in the following discussion. Supplemental accident collision diagrams and traffic volume diagrams are located in the APPENDIX.

U.S. 59 (Fremont Street) and Ferguson Avenue. The accident history of this location involved five accidents in two years. Although this is not excessive, some changes are necessary for signing conformance and general safety. The new signing should help to mark the intersection and define the narrowing of the roadway of U.S. 59 in the northbound direction.

The recommended changes are shown in FIGURE 30. If accident involvement increases, it would be desirable to continue the 35 mph speed zone to the north of Ferguson Avenue.

Sight distances are not a difficulty at this location. However, the presence of an intersection is not readily apparent to traffic on U.S. 59. In light of the approach speed from the north, an advance cross road sign is recommended as shown.

The approach from the south is two lanes narrowing to one north of Ferguson Avenue. The recommended treatment is replacement of the existing "Pavement Narrows....." signing with a Pavement Width Transition sign (W4-2) and a supplemental sign directing traffic in the right lane to turn right (R3-7).

Also, delineators should be installed in the area of the taper to clearly indicate the loss of a travel lane to oncoming traffic. These delineators should be the white type (Section 3D) placed so as to show the width reduction. Four or five delinerators at an even spacing should suffice.

U.S. 59 (Fremont Street) and Valley Avenue. This location is a T-intersection with the parking lot drive to the Gibson Store forming a fourth leg opposite Valley Street. Available accident records show six accidents occurred in two years, four in one year. No definitive pattern of accidents can be identified. However, an increase of traffic on U.S. 59 and to the store could result in an increase in accidents as the exposure to potential accidents increases, and because this drive is the principle access point to the store.

No major improvements are recommended presently because no specific accident patterns amenable to elimination are evident, and because the magnitude of accidents in general is not great enough to warrant any particular improvements. A stop sign for parking lot drive traffic should be installed to bring that traffic to a full stop and to encourage safer turning maneuvers.

U.S. 59 (Fremont Street) and Sheridan Avenue. This location is the most important in Shenandoah in terms of the total volume of traffic which passes through it. The accident experience is commensurate with the traffic as 16 accidents were reported in and near this busy intersection in a two-year period.

Four accidents were of the right angle type, indicative of failure to yield right-of-way properly. Four involved unsuccessful lane changing maneuvers and two were caused by improper turns on the intersection legs. Four collisions were of the rear-end variety, and the remaining two included an out-of-control vehicle, and a sideswipe collision of two vehicles heading in opposite directions. The four right-angle collisions are characteristics of four-way stop controls wherein right-of-way is not clearly specified.

The intersection controls are adequately displayed in the form of stop signs with supplemental "4-way" plates below the stop sign. A flashing red beacon is hung over the intersection and is supplemented by flashing red beacons mounted above the stop signs. In addition "Stop Ahead" signs are located on all approaches to the intersection.

The approaches on U.S. 59 are marked for four travel lanes. The east leg on Sheridan is not clearly marked to indicate whether traffic can or should

form two lanes on the approach. On the west leg, the approach is one lane wide flaring to two at the intersection. Each corner of the intersection is occupied by a gas station, each with driveway cuts to Sheridan and U.S. 59 (Fremont Street).

Traffic volumes as reported for 1974 were about 2700 and 5900 on the west and east legs of Sheridan, respectively, and about 7700 and 4900 on the south and north legs of U.S. 59, respectively. Turns between the east and south legs are very heavy, being 42% and 57% of approach volumes.

A high percentage of traffic continues straight through the intersection on U.S. 59, 64% from the north and 40% from the south. There is also a moderate amount of turning traffic between the north and east approaches, approximately 27% on each movement.

Operationally, the four-way stop control causes a substantial inconvenience and varying amounts of delay to motorists. Additional driver discomfort arises from conflicts in right-of-way which arise in the intersection, especially at the times of greater traffic loads.

A review of the hourly traffic volume and turning movement data from the count in 1974 was made to determine if warrants for traffic signal control at this location were met. The criteria in Warrant 1, Minimum Vehicular Volume (Section 4C-3), which allows a 30% reduction in the minimum volumes required at a location in an isolated community with a population of less than 10,000 persons, were utilized. The adjusted minimum volumes are then a total of 420 vehicles per hour on both approaches of the major street, and 140 vehicles per hour on the higher cross street approach.

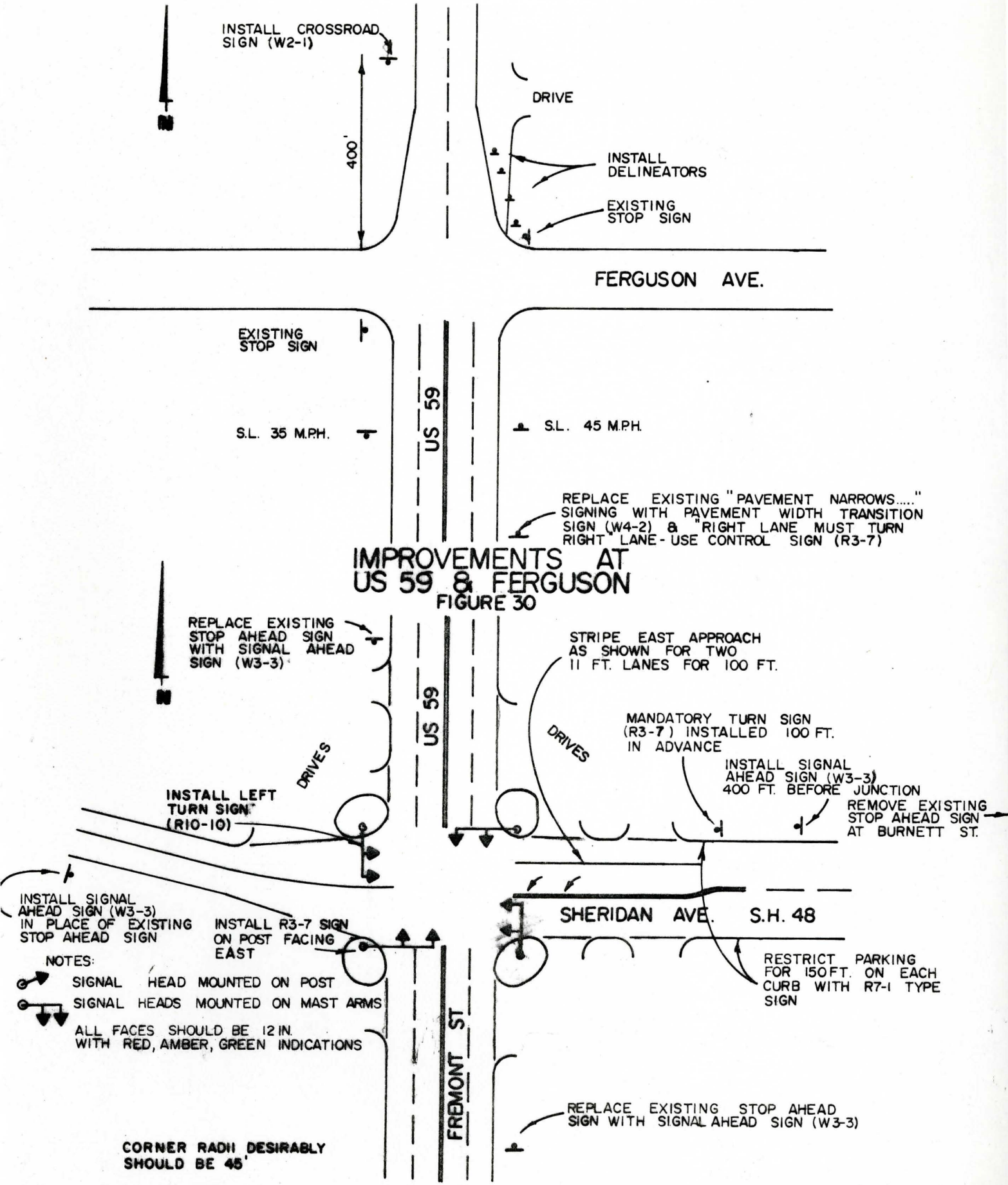
These two volumes should be met or exceeded during 8 hours during the day, and for the same eight hours for each street. The 1974 hourly count data had volumes which exceeded these requirements for six hours of the day, and three other hours for which the minor street (Sheridan) exceeded minimum volume requirement, while the main street figure (U.S. 59) was at least 92% of the stated minimum.

These volumes then, nearly meet the numerical requirements of the warrant. Additional benefits can be derived from the installation of a traffic signal at this location. The signal should alter the size and spacing of gaps in traffic heading away from the intersection. This would facilitate turning movements a block south at Thomas and U.S. 59. More orderly movement of traffic can be achieved than with four-way stop control.

Assignment of right-of-way should be clearer and righ-angle accidents should be reduced. Heavy left-turn demands can be better serviced with suitable phasing to facilitate those movement.

The eventual relocation of S.H. 2 to the south of town is not expected to substantially reduce traffic through this intersection as much of the traffic is Shenandoah-related, that is bound for or departing from Shenandoah, or arising from local circulation. As the city grows and traffic volumes increase, the signal control is more clearly justified.

A fully actuated signal installation would provide the most efficient form of traffic control for existing as well as future traffic demands. Three phases would be necessary if east-to-south left turns cannot be accommodated otherwise.



IMPROVEMENTS AT
US 59 & FERGUSON
FIGURE 30

IMPROVEMENTS AT
SHERIDAN AVE & US 59
FIGURE 31

Appropriate improvements, which should be made with the installation of the signal are indicated in FIGURE 31. Signal indications for all approaches should be mounted on mast arms. This will provide maximum visibility of the indications to motorists.

The east leg should be striped for two lanes and parking prohibited on both sides of the east leg as shown. Lane control signs are required to inform motorists the left lane must turn left.

Signal Ahead signs are required as shown to warn motorists of the signal. Striping in the vicinity of the intersection should be maintained for good visibility, as striping is an integral part of traffic control at this location. Stop lines would be desirable but would prove to be a maintenance problem. Curb radii on the northeast and southeast corners should be increased to 45 feet if physically possible to facilitate the movement of right turning traffic.

Thomas Avenue and U.S. 59 - S.H. 2 (Fremont Street). This location has experienced seven accidents in each of the two years of available records. They fall into three categories: rearend collisions on the Thomas Avenue approach (5), mid-intersection accidents (6), and three miscellaneous accidents.

A glance at the accident collision diagram shows two predominant patterns: the rear-end collisions on Thomas and accidents between left-turning traffic from Thomas and traffic across the intersection heading east toward Thomas.

The intersection is basically a T-type, with Thomas Avenue butting into U.S. 59 - S.H. 2. However, a drive opposite Thomas Avenue constitutes a fourth but not obvious leg to the intersection. As the improvement sketch for

this location shows (FIGURE 32), the drive serves the Iowa Power Company garage, Pizza Hut to the north, and a frontage road and the United Building Center and Johnson Tire to the south.

Additionally, the east side of the intersection is flanked by two gas stations with several drives. The intersection is not readily apparent to motorists on U.S. 59-S.H. 2 due to the numerous drives. The clutter of signs and poles while not restricting sight distance further contributes to the lack of intersection definition.

Field observations revealed that traffic from both the drive and from Thomas Avenue had considerable delay and difficulty at times in making left turns due to the moderate but fairly steady stream of traffic in both directions of U.S. 59-S.H. 2, particularly from the four-way stop one block to the north.

The four collisions between Thomas Avenue traffic and drive traffic is likely due to motorists not being aware of traffic approaching them across the four-lane highway. They are concentrating more on finding suitable gaps in cross traffic.

The rear end accidents on Thomas Avenue may not be as great a problem as the five accidents might indicate. Three of them occurred during icy road conditions within a three week period, and two of those were only a day apart. Driver error on slick surfaces seems to be the cause.

Otherwise an installation of a Stop Ahead sign might be warranted to warn drivers of the upcoming stop control. It is not, however, recommended unless this accident type recurs without other suitable explanation.

It would not be practical to eliminate the drive access point as it serves the frontage road and restaurant, and is necessary for direct access into the garage. Better definition of the drive in the form of curbing and paving, at least within the right-of-way limits of Fremont Street is recommended as indicated.

It would be desirable to discourage parking in front of the power company garage, but this may not prove practical or possible. The ownership of the property between the garage and the right-of-way limits of U.S. 59, restricts the controls that can be exercised.

If the frontage road is to be extended further to the south, and more cars using it, consideration of the bottleneck area near the garage will be required to properly and safely serve traffic. As it stands presently and under the recommended improvements, the geometrics, and controls at this location will function satisfactorily only under light to moderate volumes. Should extension of the frontage road to the south occur and traffic through area in front of the garage increase substantially, a review of flow patterns should be made.

This is a long-range concern. Under the magnitude of volumes at present, satisfactory and safe operation in this area is possible.

Nishna Road and U.S. 59 - S.H. 2 (Fremont St.). This intersection is controlled by a semiactuated signal installation, which basically allocates all green time to U.S. 59 - S.H. 2, unless vehicles are detected on the cross street, at which time these vehicles would receive a gree indication.

The basic signal hardware is in conformance with standards and is of high-type design with mast arms on U.S. 59 - S.H. 2 and large signal indications on each face.

Geometrics are generous and more than adequate to accommodate truck as well as auto traffic. This intersection is complicated somewhat by a rail line cutting diagonally across the west and north legs. These crossings have adequate and proper signing and crossing signals.

There is also a fifth leg to the intersection just to the north. However, traffic on Southwest Road is light and does not constitute a major difficulty to operations.

Accident experience included 8 accidents in 1973 and 5 in 1974. Four of those in 1974 were three right-angle and one turning type accidents. The fifth was a rear end collision on the east leg. The accidents recorded in 1973 were scattered around the intersection but involved three rear end collisions and three improper lane changes.

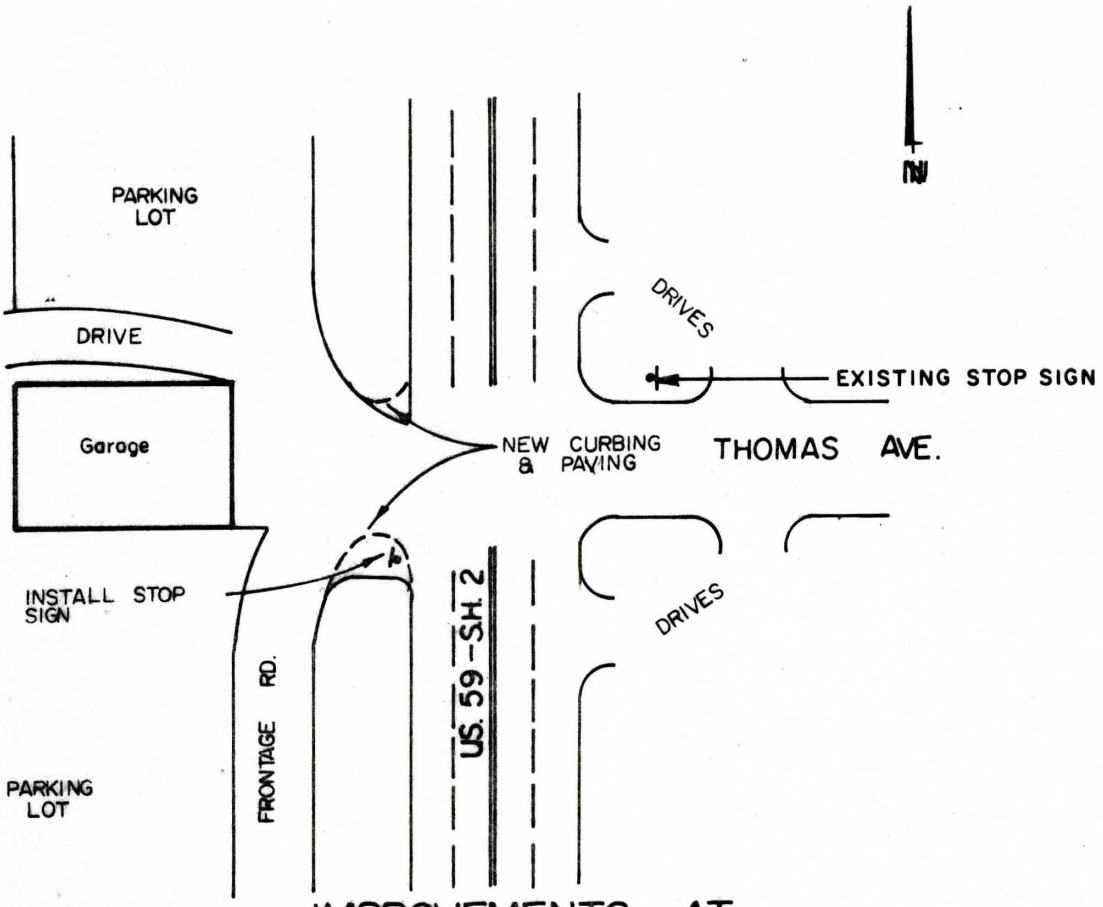
The right angle collisions did not occur under adverse environmental conditions and should not occur in great numbers at a signalized control as the right-of-way is assigned by the signal. The posted speed limit through this signal on both streets (45 mph) and driver error in judging distances properly are probably contributing causes. Although visibility is good on all approaches,

depth perception at greater speeds can be deceptive, especially when the exact edges of the intersection are not readily discernible.

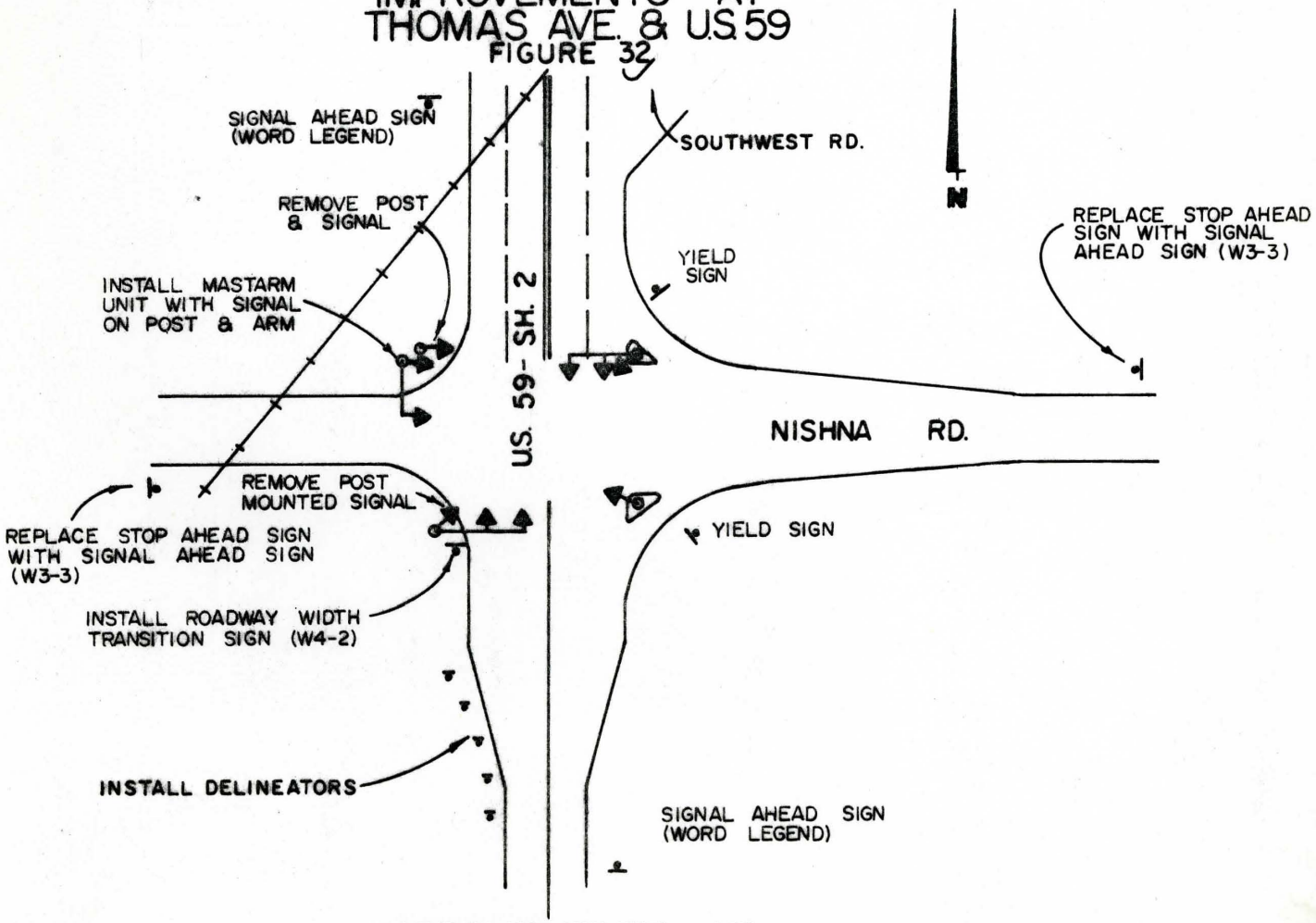
Field checks revealed no significant obstructions to visibility except on the east leg of the intersection. For traffic heading west on Nishna Road, the signal indications, located on the far side (west side) of the intersection are obscured at certain distances by near side posts and signal heads for the west and south approaches. Although this condition apparently has not contributed to any accidents, it should be remedied to forestall any occurrences.

The placement of these two far side signal heads is not in conformance with the MUTCD. Section 4B-12 specifies that the two signal faces shall be continuously visible in advance of and to the stop line for at least 250 feet, 325 feet, and 400 feet for 85th percentile approach speeds of 30 mph, 35 mph, and 40 mph respectively. This condition is not met, and is not a result of unavoidable physical obstructions, but rather unfortunate placement of the far side signals to this approach, especially that on the northwest corner. Visibility of that signal is obscured from about 200' to 350' in advance of the intersection.

To provide proper visibility of the far side signal faces to the east approach, it is recommended that the far side post and signal be replaced by a mast arm and pole with signals on the arm and post. The location of the base may require relocation. (See FIGURE 33).



IMPROVEMENTS AT THOMAS AVE. & U.S. 59
FIGURE 32



IMPROVEMENTS AT NISHNA RD. & U.S. 59-SH. 2
FIGURE 33

The Stop Ahead signs on Nishna Road are recommended to be replaced by the proper Signal Ahead signs. The verbal Signal Ahead signs on U.S. 59 are acceptable, but optimally would be replaced by the newer graphic Signal Ahead sign. Also a Pavement Width Transition sign (W4-2) is to be installed on the immediate south side of the intersection to warn of the narrowing of the roadway.

In addition, centerline striping at least should be well maintained on all approaches to facilitate safe through and turning movements at the intersection.

As the southbound roadway narrows from two lanes to one lane on the south side of the intersection installation of signing and delineators is recommended as shown.

Sheridan Avenue (S. H. 48) and Iowa St. The vicinity of this intersection was the scene of ten accidents, six in 1973 and four in 1974. Most occurred on the west leg of the intersection, and present no identifiable pattern.

Sight distance is restricted somewhat from the south approach to the east as the southeast corner is occupied by an automobile dealership which has cars parked on the corner. Similarly the view from the north approach to the east is hindered at times by cars parked in front of a laundromat. Neither of these conditions however appeared critical from field checks, nor does the accident history show a problem in this regard.

The stop signs on Iowa St. are properly located, and overhead street lighting is adequate. Other than the removal of some parking on the northeast and southeast corners, which would present hardships to the adjacent business establishments, no improvements which would affect significant accident reduction were conceived. Better maintenance of the striping along Sheridan Avenue which should help motorists make better turns and generally improve the flow of traffic, is recommended. Also the prohibition of parking on the first 50' of the south curb of the west leg of the intersection is recommended. Demand for parking is not critical, and the prohibition should improve visibility from the south leg.

Sycamore Street and Valley Avenue. This intersection experienced only two accidents in 1973 but had five in 1974. Two were right-angle types, two involved turning cars, and the remaining three varied in type. Valley Avenue traffic must stop while Sycamore Avenue traffic does not. Sight distance is limited somewhat on the northwest corner by a hedge, but the hedge appears to be maintained to a reasonable height.

Another hedge on the northwest corner is also trimmed to within reasonable limits. However, a row of large trees on the east side of Sycamore Street north of Valley Avenue does hamper sight distance for motorists who do not roll forward slightly after stopping at the stop sign.

Parked cars on the east side of Sycamore could also lessen sight distance from the east approach to the intersection. Also the stop sign on this leg is obscured at least partially by some tree branches. This condition apparently contributed to one accident.

The principal need is to improve and maintain adequate visibility for waiting motorists on Valley Avenue. Traffic on Sycamore Street is in the vicinity of 2200 vehicles per day. Much of this volume occurs in the morning and evening, and is generated by the Henry Field and other operations north of this point. Generally, traffic volumes are not a constricting factor. Moreover, speed limits are 25 mph, sufficiently low to permit safe operations if the limits are observed.

To facilitate safer crossing and turning maneuvers by Valley Avenue traffic, it is recommended that parking be prohibited on the east side of the north and south approaches and the north curb of the east approach for the first thirty feet from the corner. "No Parking Here to Corner" signs would be suitable.

Downtown Area

For the purposes of this discussion, the downtown area is considered to be that portion of the City lying on or between Lowell Ave., Railroad St., Thomas Ave., and Willow St. Within this area the bulk of pedestrian and vehicular activity occurs.

It is not surprising that over 25 percent of the vehicular accidents happened in this area. Over half of these occurred along Sheridan Avenue from Railroad Street to Sycamore Avenue. Only three vehicle-pedestrian accidents were reported in the two year period, fortunately.

A brief summary of existing on-street conditions is useful at this point. Lowell Avenue is 44 feet wide from Railroad Street east to Sycamore where it narrows to 31 feet. Parallel parking on both curbs is permitted except in spot locations, such as in front of the post office. Thomas Street is 44 feet wide, except between Maple and Clarinda where it is 56 feet in width. Angle parking is allowed on both curbs. Clarinda Avenue is also 56 feet wide with angle parking on both curbs.

Maple, Elm, Blossom, and Sycamore Streets are 40 to 44 feet in width with parallel parking on both curbs in the downtown area, except on South Blossom where angle parking is permitted.

Sheridan Avenue, often informally referred to as Main Street, is the spine of the Central Business District. It is 56 feet wide and has angle parking on both curbs, except for certain end stalls where parallel parking is required. A more detailed accounting of on-street parking in this area is seen in FIGURE 5 in PART III.

A large fraction of the accidents in the downtown area are directly related to the angle parking used extensively on Sheridan and Thomas Avenues. However, there are four locations in the downtown area with accident experience that are not connected with angle parking so much as it is with other factors. These locations are discussed below.

Lowell Avenue and Sycamore Street. This location was the scene of eight accidents, seven of them in 1973. Three of these occurred in front of the post office, located on the northwest corner. The street curbs to the east and south side of the building are painted yellow, indicating "No Parking." However the curb on Lowell is regularly used by postal patrons making short visits to the post office.

At the west end of the post office on the street is a curb drop-off box, and off-street is a small lot intended for postal patrons. However, the lot is located at the farthest point possible away from the entrance to the post office, and consequently the lot is seldom used. Rather the curbs on both sides of Lowell in front of the post office are used, although they are both painted yellow and are approaches to curb drop-off boxes.

Admittedly the curbside boxes are not extremely convenient for motorists with no passengers, and the boxes can prove difficult to use for some persons. Also, they only facilitate drop-off of mail, not pick-up.

The use of the curb in front of the post office can prove hazardous as the turnover rate is high, it occurs close to a blind corner, and can conflict with westbound traffic on Lowell.

The other accidents are basically right angle collisions in the intersection. Sight distance is somewhat limited by buildings and parked cars.

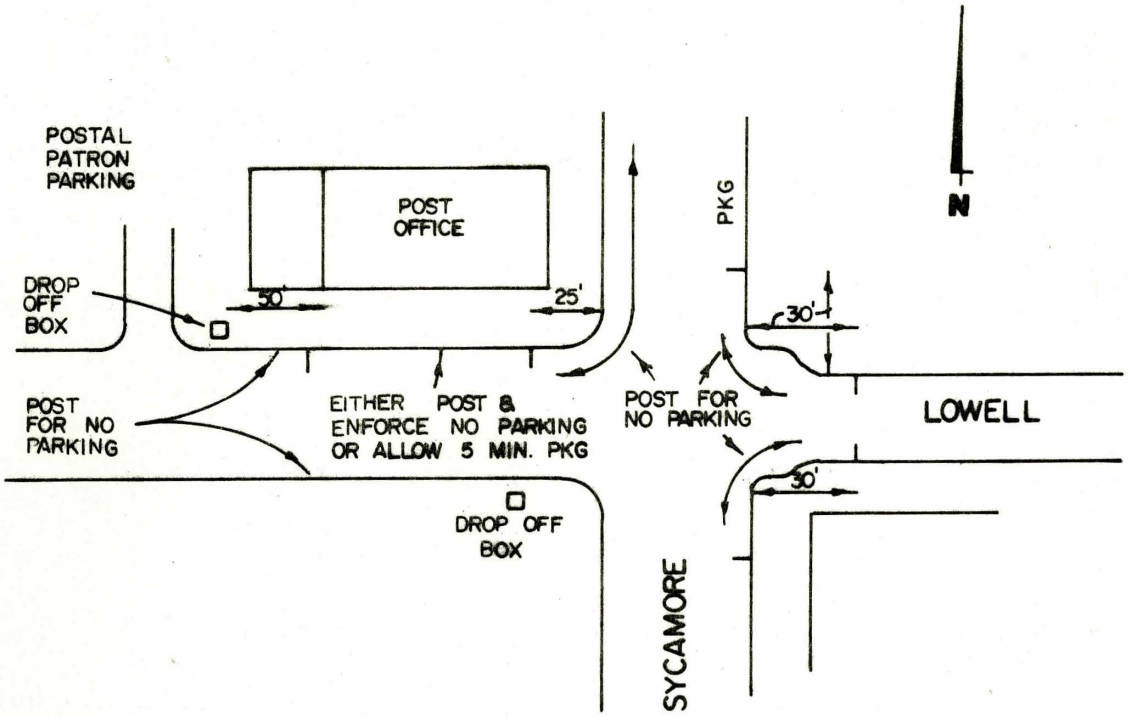
From the west approach the view to the north is unobstructed as parking is prohibited east of the post office. To the south sight distance is adequate as parking is prohibited on the west curb of Sycamore.

From the east approach parked cars on the east curb of Sycamore can hamper visibility somewhat. Parking is not permitted the last few feet on Sycamore on the southeast corner, but this restriction was observed to be disobeyed frequently. On the east curb of the north leg parking is permitted and is used by some postal patrons during the day.

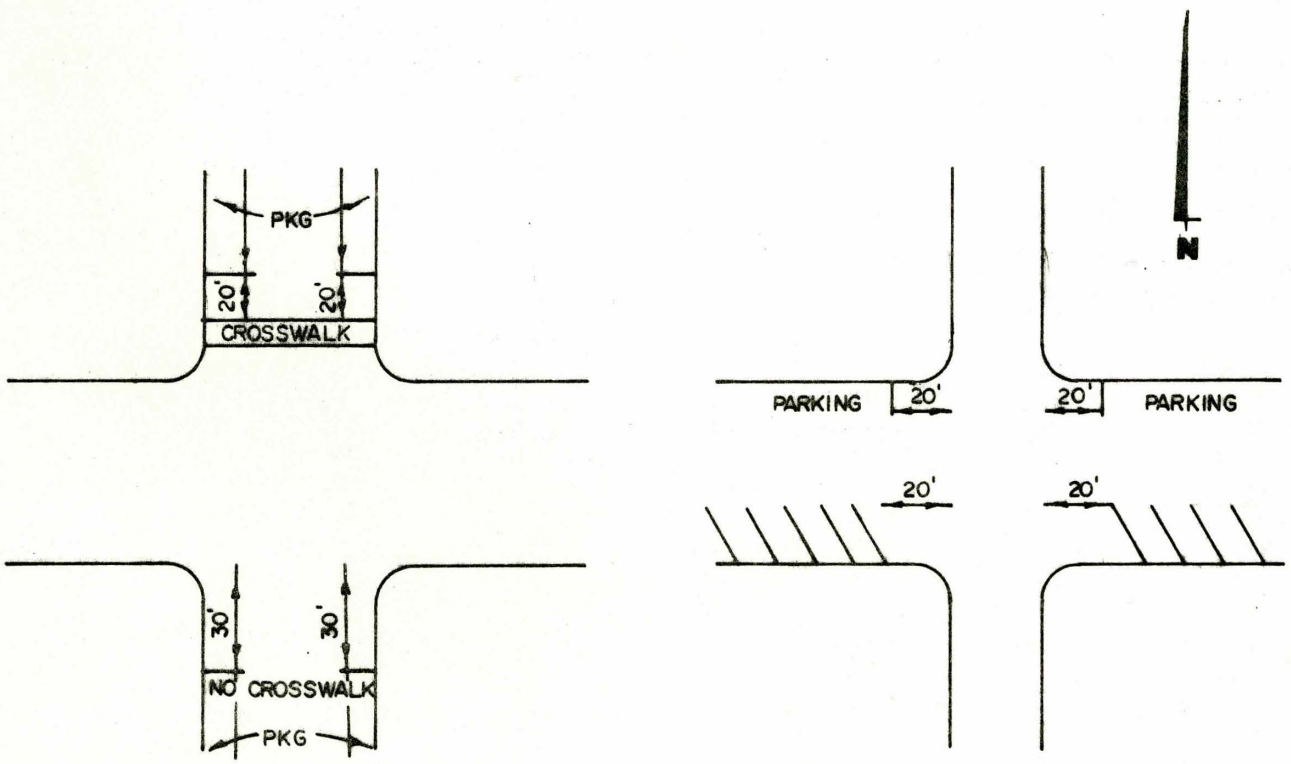
Traffic volumes at this intersection are about 2200 and 2600 on the north and south legs of Sycamore and 1500 and 3300 on the east and west legs of Lowell. Nearly all traffic from the south continues north or turns left, with nearly equal split. From the north most traffic turns right or continues through, again nearly equally. From the east, nearly all traffic proceeds straight. From the west, most traffic turns right or goes straight in nearly equal amounts, while some 15% turns north.

These traffic volumes and the accident history do not appear to warrant any change in controls at this time. However it is recommended that special no parking zones be instituted as shown in FIGURE 34, and enforced. The no parking in front of the Post Office should either be supplemented with signing and be enforced, or 5 minute parking should be permitted. The existing no parking on the east curb of the south leg should be enforced and additional no parking zones be instituted as shown.

The unfortunate layout of the Post Office site contributes to the traffic and minor congestion at this location. Discussions with the Postmaster



IMPROVEMENTS AT
SYCAMORE & LOWELL
FIGURE 34



AT INTERSECTIONS AT ALLEYS OR DRIVES

MINIMUM CLEARANCES
FIGURE 35

indicated that solutions and improvements were considered, but that none were found. This location may warrant signalization if volume and delays increase and accidents are a continuing problem. Accident records were not complete enough to determine if 1973 was an extraordinary year in terms of accidents.

Lowell Avenue and Blossom Street. Although five accidents occurred in the vicinity of this intersection in 1974, they are scattered in location and varied in type. No pattern amenable to reduction could be identified and no significant traffic control deficiencies were observed. It is recommended that the parking lot on the southeast corner be marked with the appropriate green and white parking signs.

Lowell Avenue and Elm Street. Five accidents were recorded in 1973 and one in 1974 at this location. Four of these involved cars backing out of or leaving drives on the north side of the east leg. No improvements are readily apparent which would discourage backing onto the street from these drives.

At the intersection proper, no deficiencies were noted. Traffic volumes and accidents do not warrant any change in intersection controls at this time.

Thomas and Clarinda Avenues. There were seven accidents in 1973 and five in 1974 at this multi-legged intersection. Five occurred in the intersection proper while the others involved angle and parallel parking at scattered locations. Three of the five mid-intersection accidents involved vehicles from the northwest approach of Clarinda Avenue.

Five of the six legs of this intersection are required to stop. The

northeast approach of Clarinda is not however. This non-symmetry of controls is confusing and hazardous to motorists as the skewed and off-set geometrics of the various legs plus the width of Clarinda and Thomas Avenues results in a great expanse of paving. Within this large area it is possible for motorists to lose their orientation. In addition a large number of potential conflicts are possible. Moreover, a motorist on any approach must scan over 120° from left to right to check for conflicting traffic.

One step towards the simplification of this intersection would be the closing of Sycamore Street as recommended in The Comprehensive Plan. The City will have to determine if such action is still practical and desirable from a planning standpoint.

As far as intersection controls are concerned, traffic volumes and accidents are not great enough to warrant what would have to be a more costly than usual type of signal installation. The cost of signal control and the ensuing delays to what is presently not a heavily travelled intersection are not justified under existing conditions.

The following recommendations are made in the interest of uniformity and safety. The east approach of Thomas Avenue should have a 30 inch stop sign mounted seven feet high for adequate visibility to approaching motorists. A 30 inch stop sign should be installed on the southeast-bound leg of Clarinda.

This would bring about uniformity of controls at the intersection. All six stop signs should then have supplementary white-on-red plates (R1-4) bearing the legend "All Way" installed below them.

These changes will not eliminate the geometric difficulties of this intersection. Eventually, a three-phase signal installation may be the cost-effective solution.

Clearances. Certain clearances along curbs should be observed from drives, alleys, and streets to allow adequate space for vehicle maneuvers, proper sight distances, and safe pedestrian crossings. Such clearances are summarized graphically in FIGURE 35. It is recommended these guides be applied at various locations where proper clearances are not in effect.

Sheridan Avenue. This is the principal street of the City in terms of pedestrian and vehicular activity. The four block stretch from Railroad St. to Sycamore accounted for about 14% of the accidents which occurred in 1973 and 1974, or about 85 accidents in a two year period.

About two-thirds of these were related to the angle parking on Sheridan Avenue, and another ten were rear-end accidents. The rest were varied in type.

Although the accident collision diagrams in the APPENDIX are aggregated by intersection, the fact is that none of the intersections in the downtown area on Sheridan Avenue has a significant intersection related accident experience. That is to say that very few accidents occurred in the middle of the intersection. Rather, the approaches to the intersections are the areas of critical accident experience.

Typical accident types are as follows:

1. Rear end collisions.

2. Angle-parked vehicle backing into moving vehicle.

3. Angle-parked vehicle backing into vehicle stopped for a signal.

4. Angle-parked vehicle backing into vehicle across the street also leaving a stall.

5. Parking vehicle hitting an angle-parked vehicle.

As was described in PART III under the existing traffic conditions, numerous conflicts arise between angle parked vehicles and the passage of traffic. These conflicts which contribute both to congestion and accident potential are not reiterated here.

The basic conflict, and that which most clearly evidences itself in the accident reports is the difficulty of the parked cars in backing out of the stalls. Field tests showed this to be a difficult procedure during daytime hours when the adjacent vehicles were sedans. But when pick-up trucks, campers, or station wagons were next to the unparking vehicle, the maneuver was a blind and hazardous one.

Not only is the angle parking an operational problem in its own right, but its extensive usage contributes to lessened visibility at the intersections. Angle parking is allowed on nearly every foot of curb except for corner radii, and for the first stall in each direction of a block which is a parallel-type stall. Such clearances are inadequate.

The angle parking, while providing maximum parking at a minimum distance from stores is in fact a great disservice to motorists in terms of accident exposure, good circulation, driving comfort and convenience, and in accident costs. Angle parking accident rates are typically 2 to 4 times those of parallel parking.

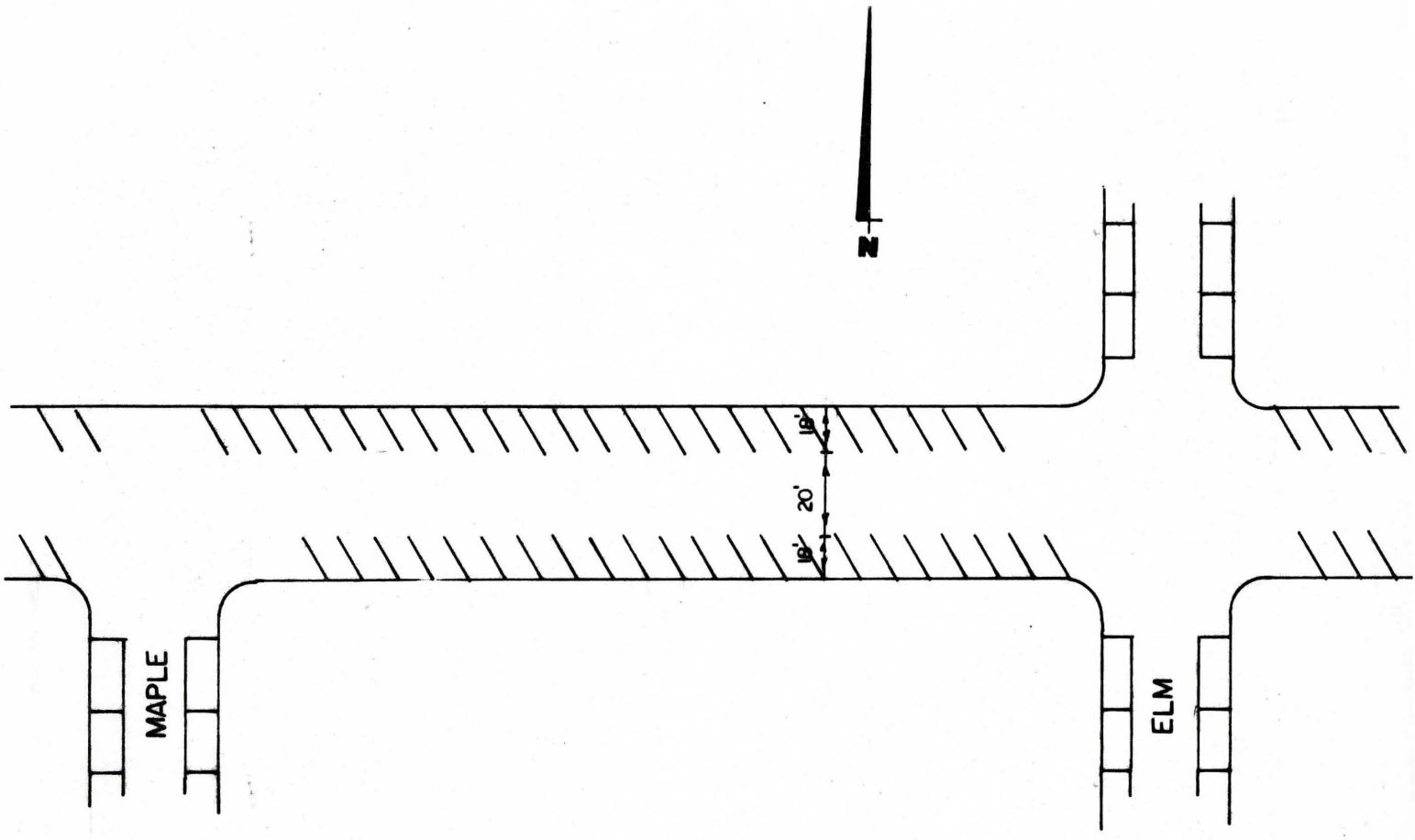
In light of these facts it is recommended that the angle parking on Sheridan Avenue be removed and replaced by parallel parking in a scheme similar to that in FIGURE 36. The parallel parking is in a tandem arrangement which allows easier access and egress to the stall.

Revision of the intersection corners as suggested serves to define the intersection, lessen pedestrian crossing distances, and shelter the parallel parking. Between intersections, wide travel lanes will be provided. Alternately, an island planted with shrubbery or flowers could be constructed. Additionally, if the new corners are installed, curb cuts for wheel-chairs should be included. These larger corners would also provide space for planters, benches, and other beautification features, selected so as not to obstruct visibility at intersections.

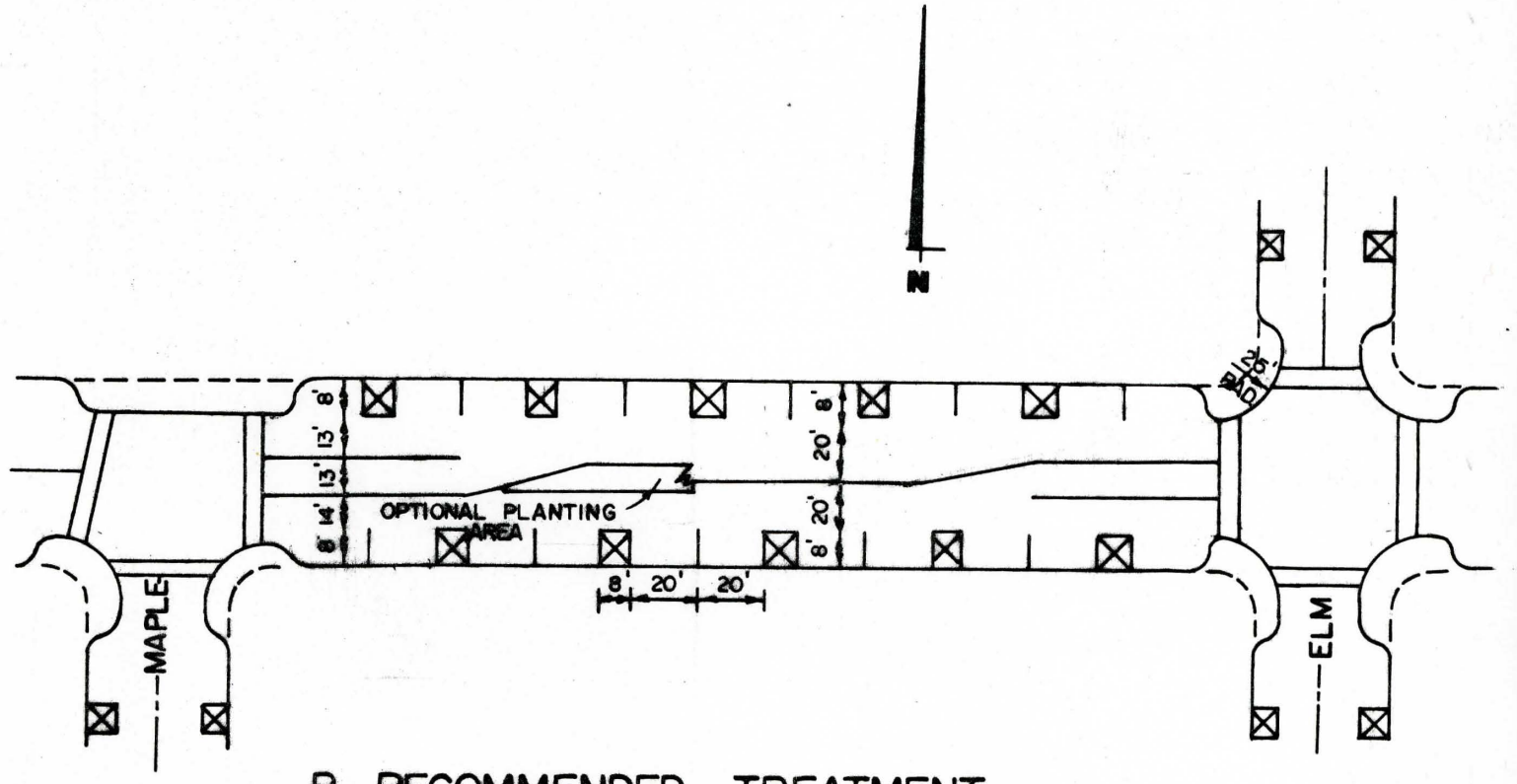
The removal of the angle parking is made in cognizance of the fact that in a typical block on Sheridan Avenue, the available supply of parking would be reduced from 46 spaces to 20 spaces per block. In the four blocks from Railroad to Sycamore, this would amount to about 100 spaces.

The recommendation to remove angle parking is in conformance with The Comprehensive Plan. Moreover, the net loss of spaces would be less than 100 as under-utilized side street parking and city lots could pick up part of the slack. It is clear, though, that other actions are necessary in conjunction with this recommendation.

The City should pursue the feasibility of acquiring additional convenient off-street parking, and more importantly, revise and update the street plan for the downtown area. The original concept is still essentially sound and feasible, but more recent thinking should be injected into it.



A. EXISTING CONDITIONS



B. RECOMMENDED TREATMENT

SHERIDAN AVE.

FIGURE 36

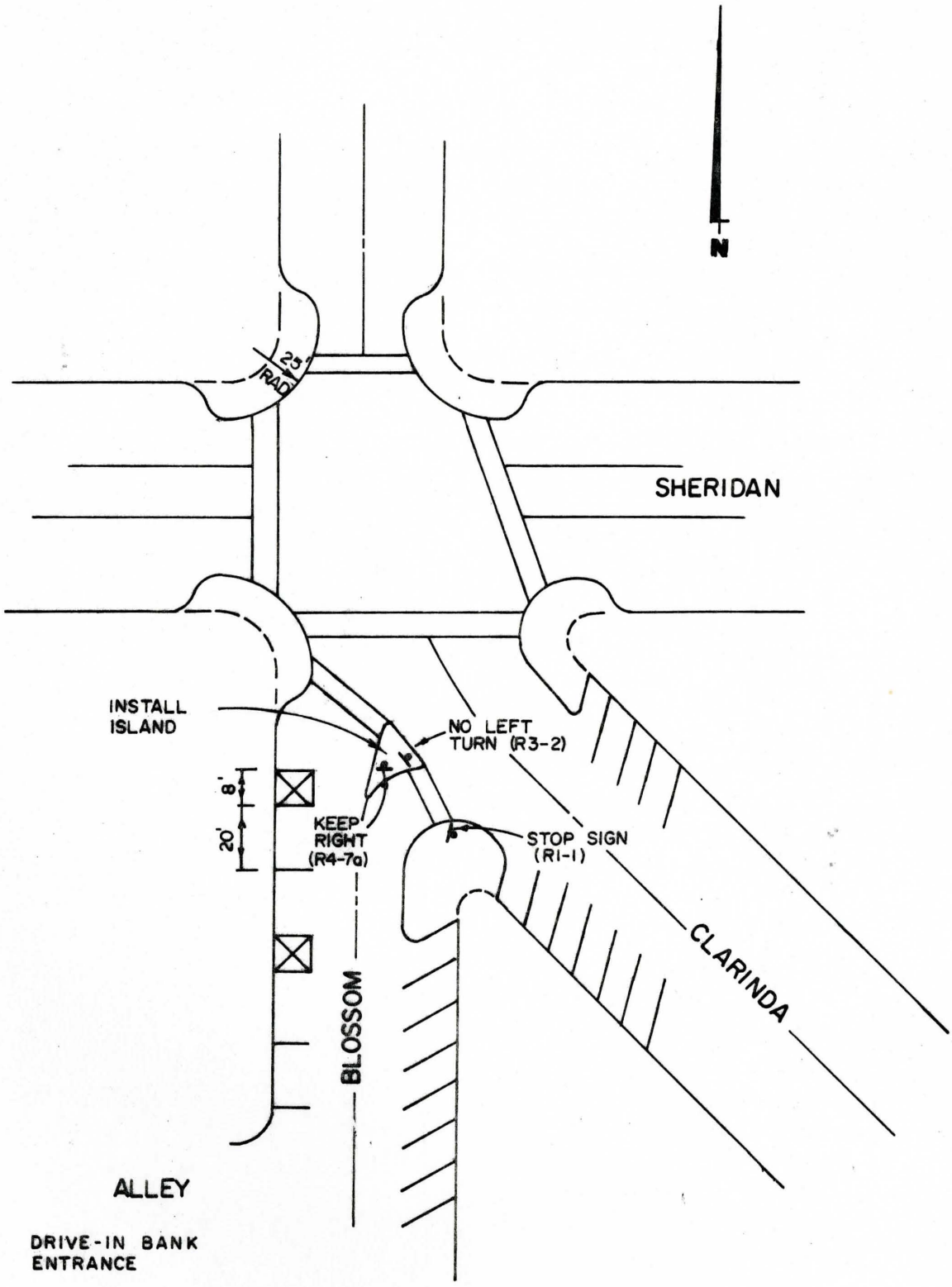
Special consideration is required at the intersection of Sheridan and Clarinda Avenues, and Blossom Street. The signal controls here give both Blossom and Clarinda a green indication simultaneously, a hazardous feature. As Blossom Avenue carries only about 300 vehicles per day into the intersection from the south, a treatment as shown in FIGURE 37 is recommended. Any northbound traffic would be required to turn southeast onto Clarinda Avenue.

This modification simplifies intersection control, lessens conflicts and hazards, and still permits adequate circulation.

In conjunction with the recommendation to replace angle parking with parallel parking, some discussion of S. H. 48 is appropriate. The City recently pursued the relocation of this highway from Sheridan Avenue to Ferguson Avenue. However, the cost of upgrading Ferguson Avenue to suitable standards proved prohibitive.

Other routings are possible. One is to continue the routing south on Center Street to Nishna Rd, then west to U. S. 59. A second is to continue south on Center Street to new S. H. 2. Either of these are feasible, but run through residential areas and past schools. The merit of pursuing them must be determined at the local level.

Besides Sheridan Avenue, angle parking is also found on Clarinda Avenue and Thomas Avenue. The eventual removal of angle parking on these streets is also recommended, and would comply also with The Comprehensive Plan. As evidenced by the accident collision diagram for Thomas Avenue at Elm Street, the inherent accident potential of angle parking is beginning to show itself.



IMPROVEMENTS AT
SHERIDAN, CLARINDA & BLOSSOM
FIGURE 37

For the short term, replacement of the angle parking on these streets should not occur, as the loss of these additional spaces without adequate replacement is not practical or logical.

In the long run, however, provision of off-street parking for the bulk of parking demands is recommended. In this way, the streets can better serve their principal purpose of circulating traffic and their secondary purpose of vehicle storage in the form of parallel parking.

The signal controls on Sheridan and Thomas Avenues are the pretimed type operating on a 50-second cycle with 25 seconds allocated to each of two phases (22 sec. green and 3 sec. amber). With the delays and interruptions to smooth traffic flow, no progression of traffic is feasible, and from observation no attempt is made to improve flow on Sheridan in less congested hours.

For immediate implementation it is recommended that the signal lenses be cleaned as some are quite dirty. This should be performed on a quarterly basis. Also, to allow some progression of traffic in off-peak hours, it is recommended that the phasing of the four signalized intersections be patterned into a double-alternate system.

In this system, one pair of the signals, say those at Maple and Elm Streets, would be set to give a green indication to Sheridan Avenue. The remaining pair of signals at Blossom and Sycamore would be set to give a green indication to Sheridan Avenue when the other pair of signals gives a red indication to Sheridan Avenue.

The existing 50 second cycle with 50-50 split should be retained as it is adequate for traffic loads and provides adequate pedestrian crossing

time on all approaches. The use of the non-conforming portable No Left Turn sign units can be continued until other recommendations are implemented. However, conforming No Left Turn signs should replace the present white-on-blue signs currently in use. Although this constitutes a non-conforming usage in placement and portability, it is felt that it is a suitable and practical interim solution to a predictable spot traffic operations problem.

The recommended eventual improvement of the four signals on Sheridan and the two on Thomas should include new signal heads with 12 inch lens, as well as pedestrian "Walk-Don't Walk" signals, and heavy duty controllers to handle these loadings. Also the controllers should be capable of automatic switching to flashing operation during over-night periods. The signal post locations may require relocation depending on if the corner treatment is implemented at intersections.

Mast arms for Sheridan Avenue would repre sent the optimum treatment for control and visibility. Their incorporation is optional from the traffic safety standpoint.

Actual physical interconnection of the signals is not justified financially or operationally. Use of the double alternate system described above should be maintained. Again, under this scheme, while the two signals at Maple and Elm would give a red indication to Sheridan, those two at Blossom and Sycamore would give a green indication to Sheridan, and vice versa.

The specified half-cycle offset between the two pairs of signals is instituted by a visual coordinating of the signals, and should be checked from time to time to maintain the proper offsets.

Other Signing and Controls

A number of miscellaneous locations where non-conforming signs are used, where additional signs are needed, or where discussion of specific and general guidelines are indicated, were observed across the City.

The Fire Department facilities are located on Grass Street between Sheridan and Lowell Avenues. To warn motorists of the possibility of fire fighting vehicles in the vicinity, signs bearing the legend "Caution-Emergency Vehicle Exit" are posted on Lowell, Sheridan, and Thomas Avenues in advance of their intersections with Grass Street.

These signs are 18 inch by 24 inch rectangles with white on blue legends. As they function as warning signs, they are not in conformance with accepted standards. The signs should be yellow diamonds, 30 inches on a side, with a legend such as "Watch for Emergency Vehicles" or similar legend.

Their placement on Lowell and Sheridan Avenues is justifiable. However, their posting on Thomas Avenue is not necessary as the emergency vehicles would be under way by that point, are equipped with their own warning devices, and do not out of necessity regularly pass this location. Although this route would be logically used to bypass any congestion on Sheridan Avenue, the installation of the warning signs at Thomas and Grass is not considered essential.

It is recommended the six white-on-blue signs be removed and those on Lowell and Sheridan Avenue be replaced by the yellow warning signs previously described.

Other minor recommendations refer to two speed limit signs on Center Street. It is recommended the 25 mph speed limit sign just north of Anna Crose Highway be replaced with a larger 24 inch by 30 inch sign of identical legend, or that the existing sign be cleaned and mounted according to guidelines. It is important this sign be legible and visible as it constitutes a reduction in speed and the area is residential.

At the other end of Center Street north of Ferguson Ave., the southbound speed limit is 45 mph. In light of the less than optimum geometrics of the intersection of Ferguson Ave. and Center Street, the multiple track rail crossings one block south and the 25 mph speed limit posted south of Wabash Street, it is recommended that an intermediate speed zone of 35 mph be instituted through the intersection. The 45 mph zone should be posted at the north city limits, and the 35 mph zone should begin approximately 350 feet north of the intersection.

Also, no parking signs should be installed on Center Street south of Nishna Road to Colonial Ave. as the roadway section to conform to the prohibition to the north.

Curb parking restrictions are often required on arterial streets and are generally accepted. However, prohibition of curb parking on collector streets and other travelled streets in residential areas often stir opposition.

The basic conflict is between on-street storage of vehicles and the safe and efficient movement of traffic on that street. Basically, priority should be given to the movement of traffic if the street is designated as a collector, or if the street is otherwise carrying a noticeable amount of traffic.

Ideally, streets are constructed to a width suitable for the amount of traffic expected to use them. Sometimes, however, traffic is induced to travel a street for which provision was not made.

In this event, several options are possible. The traffic can be re-routed, which often is not practical. The street can be widened, in which case cost and the source of financing become issues. Lastly, curb parking can be removed from one or both sides as necessary, in which instance the protest of abutting property owners is often aroused.

This last option also can prove questionable if the abutting properties have no driveways and the owners rely on on-street storage of their vehicles.

This discussion points out the need for the formulation and implementation of a street thoroughfare plan, with revisions made as necessary to assure a reasonable and sufficient distribution of the different classes of streets. By so doing, the conflicts described above can be avoided.

Report 3 of The Comprehensive Plan delineates acceptable cross-section standards for various categories of streets. In most cases a minimum street width of 30 feet as indicated is desirable from the standpoint of vehicular and pedestrian safety, street maintenance, and snow removal.

Generally, on streets 26 to 31 feet wide, two sided parking is acceptable so long as traffic is light. If the traffic is heavier, with the street designated as a collector, one-sided parking is recommended.

Optimally, the widths of city streets would conform to standards proposed by the American Society of State Highway and Transportation Officials (AASHTO). These standards call for traffic lanes of twelve feet in width, and parking lanes of eight feet in width.

Consequently, a street with two lanes of traffic and one lane of parking would require 32 feet of driveable width. For two-way traffic with parking on both sides of the street, a total width of 40 feet would be necessary, according to these standards.

Such street widths represent the optimum situation. Oftentimes, these standards are sacrificed to varying degrees by local zoning or development regulations because of constraints in the financing of street improvements, local desire to encourage new development, the history of street widths typically permitted, and other factors.

The importance of planning extensions of existing collector and arterial streets into new areas of development is vitally important to forestall future traffic bottlenecks, and instances of excessive traffic utilizing streets which are intended primarily for local type traffic. Delineation of future major streets, and their physical design as well, is recommended.

Several problem areas regarding existing streets and usage of their width for traffic and parking are discussed as follows:

Part of Monroe Street at the east end of Sheridan Avenue is on the city major street system as a connector to Farnham Street. Additionally, South Monroe serves to disperse traffic heading south from Sheridan Ave. Presently two-sided parking is permitted on a street only 24 feet wide. Field checks revealed that few houses on the east side of Monroe and these have drives. Therefore it is recommended that parking be prohibited on the east side of Monroe between Carter Street and Thomas Ave. in the interest of safer and smoother movement of vehicles.

Cottage Street is a short street running one block between Elm and Maple Streets south of Nishna Road. It is an asphaltic surfaced street of irregular width averaging about 20 feet. The gravel and grass shoulder appears to be used irregularly by abutting property owners. No urgent need to prohibit parking on one side was noted, but if parking infringes substantially on paved part of the street restriction of parking on one side may be justified.

Vista Ave. from Summit Ave. to Pioneer Ave. has 30 feet of roadway and presently no parking restrictions are in force. South of Nishna Road, the properties have large drives and the density of dwelling units is 4 per acre. North of Nishna Road, however, the properties have no drives and the density is 7 lots per acre. Consequently, the demand for on-street parking in this section can be expected to be greater on both counts.

The conflict arises in that Vista Drive connects the newer subdivisions and the high school to Clarinda Ave. which provides the most direct access to downtown and many parts of the city. Two-sided parking on a 30 foot street leaves about 14 feet of through travel space. According to The Comprehensive

Plan, East Street was suggested to be extended south of Nishna Road as a collector street into the newer residential areas and south to Anna Crose Highway. However, the street system has not developed this way.

One option is to widen the street six feet to provide two travel lanes and curb parking. This would be costly and could not be justified at present. Thus the decision is reduced to one of whether or not curb parking should be removed from one side of the street. If it can be shown that one curb will provide sufficient storage space for vehicles, without creating undue inconvenience or hardship to those persons losing curb parking, then removal of parking on one curb is suggested.

Pierson Drive is a cul-de-sac off Sunset Blvd. With only 23 feet of width, two-sided parking should not be permitted. This would allow easy access by emergency vehicles and facilitate street maintenance.

Crescent Street is 30 feet wide and serves properties with 44 to 50 foot frontages. The street is extensively used for parking, especially overnight. This leaves a 14 foot area for traffic. As Crescent is not a through street and the on-street parking seems necessary, parking prohibition does not seem warranted. Although, two opposing cars have to proceed slowly if two-sided parking is present, emergency vehicles can pass through the area. Snow removal and street sweeping would be accomplished less than desirably, but residents will have to sacrifice this to some extent for the parking.

North Center Street between Valley and Wabash Avenues has 30 feet of travel space with parking prohibited on the west curb. This leaves space for two 12 foot traffic lanes which is adequate. Parking regulations here appear satisfactory.

Another block where parking is a concern is Elm Street between Valley and Lowell Avenues. Here angle parking is found on the west curb and parallel parking is allowed on the east curb. This combination of parking leaves a travel space of about 15 feet. This is quite a narrow space for two-way traffic especially near to the downtown area. However, the spaces are relied upon greatly for mainly employee parking at nearby businesses, and the turnover rate is low. Also, a traffic count indicated the daily traffic at about 400 vehicles per day, a low figure. Also, accident experience is minimal. Therefore, no change in regulations is considered a necessity from the traffic safety standpoint.

Another area of lesser importance concerns the installation of object markers (Type 1 or Type 3, Section 3C-1). These are recommended at several locations to warn motorists of obstructions along various roadways. These locations are:

1) On the bridge abutments on Northwest Road just south of Ferguson Ave.
2) On the bridge over Johnson Run at Mitchell Street.
3) On the bridge over Johnson Run at Sunset Blvd.
4) On the tree in Mitchell Street near Park Ave.

Administration and Records

A number of additional recommendations which do not fall in the realm of operational or physical improvements can be made regarding administration and records.

It appears that several bodies are involved at one time or another with some aspects of traffic controls, regulation, and enforcement in Shenandoah: the City Council, Street Department, Police Department, and City Manager. Since investigation of need, cooperation between involved parties, proper design, and adequate installation are all important in implementing traffic measures, it is recommended that the City follow the documentation in the MUTCD regarding traffic control devices, and suggested that proposed additions or revisions to traffic controls be reviewed by the appropriate parties as to need and suitability. The City should obtain a copy of the MUTCD and consult it as necessary.

Grade school children should have proper school crossing procedures explained to them and should be made familiar with the newer crosswalk signing. Similarly, motoriests likewise should be made aware of new signing and its usage, possibly through newspaper articles.

It is recommended that a record be kept of traffic control devices and their location. This can easily be accomplished using a large scale map of the city on which the location, size, and type of signs is recorded. In this way, replacement of a missing sign is expedited as its exact location and type are readily

available. Supplementary records regarding repairs, replacements, vandalisms, and dates would be desirable, but is not specified.

Accident records are an invaluable tool in examining the operational safety of an intersection and determining and identifying geometric or operational deficiencies. For this reason, procedures for the proper and complete filling out of accident forms should be encouraged within the Police Department. This includes a good description of the location of the accident if it did not occur in an intersection by referring to street address, parking meter number, or other landmark.

More complete follow-up on actual damages to vehicles and personal property would allow a determination of the true costs of accidents at a particular location or city wide. The new accident report forms, although longer and more time-consuming, will facilitate future accident investigations, provided all the needed data has been properly recorded.

Presently, the accident reports are filed by report number, which provides a generally chronological sequence. This is supplemented by a cross-reference card file which yields the date and number of accidents at a general location, as previously described in PART III of this report.

It is recommended that the cross-reference file be revised as described in the Traffic Engineering Handbook, pages 229 and 230. The system would still be based on accident locations, but would allow more precise location filing of the accidents.

In this instance, the location file would be an alphabetical card file of street names. Primary guide cards bearing the name of the street that comes first alphabetically followed by secondary guide cards bearing the name of the intersecting street, or block numbers for mid-block segments. On these secondary cards, would be recorded the year and report number of accidents which occurred at that cross street or that midblock segment.

An accident pin map is maintained in the Police Department. However, it is recommended that the pin map be photographed at the close of each year. A large, good quality print should be kept on file for reference and comparison to other years.

Also, it is recommended that the actual accident report forms be kept on file for a five-year period. The space required is not excessive, and the availability of several years of past accident records will permit more thorough traffic accident investigations, should the occasion arise, or should the accident experience at a certain location warrant detailed study.

Guide signing on city streets takes two forms. The first is the street name signing, which was observed to be fairly complete. It is recommended at locations without the street signing or other locations where the older signing is illegible that proper signing be installed and conform in style and appearance with the green and white signing now predominantly in use.

The other guide signing provides directional information to motorists regarding the location of local attractions or points of interest. Presently this type of signing is found at several locations including Center Street at

Sheridan, Nishna at Elm, and Center at Clarinda. This signing gives directions to the downtown area and to various numbered highways in the area. The signing is old, illegible, and damaged for the most part. It is recommended that directional signs in this condition be removed as they do not function properly and serve only to clutter the street.

Should the City find such signing desirable to assist visitors to the City, it is suggested that consideration be given to points of interests and access routes in planning the location and usage of these additional guide signs.

Their location should not interfere with the visibility or operation of other traffic controls, and their placement should not be such to induce hazardous turning maneuvers. Also their appearance should conform to the guidelines of the MUTCD.

In a similar vein a series of signs is located around town and is intended to provide a driving tour of the City. The use of these signs is acceptable so long as they do not impair the effectiveness of traffic control signing. It is suggested that the signing on the route be field checked for completeness and legibility to avoid the possibility of a visiting motoriest getting lost on city streets.

The City is to be commended for the use of the green and white parking signs used to call attention to off-street parking lots. Such signing can reduce confusion and unnecessary circulation on the well-traveled downtown streets.

A useful addition to the city ordinances would be one providing for minimum sight distances at intersections. Such an ordinance generally regulates

the height of vegetation and fencing within a certain area on each corner of an intersection. Generally this area is triangular, with the two equal legs extending 30 feet back from the corner of the rights-of-way.

Such an ordinance is not intended to be used indiscriminantly, but rather as a device to develop minimal sight distance at locations where a hedge, tree branches, or fences obscure visibility of cross street traffic or of traffic signs. A copy of the City of Omaha ordinance relating to this matter may be found in the APPENDIX.

Additionally, it is recommended that City ordinances be updated as necessary as a result of implementing the changes and improvements contained in this study.

PART V

RECOMMENDATIONS AND IMPLEMENTATION

The preceding parts of this report have dealt with existing traffic operations on city streets, and with the formulation of certain improvements and modifications for the betterment of public safety and the reduction of accidents.

These recommendations require implementation, though, to effect their improvements in safety. Implementation requires a schedule or priority listing of improvements as well as suitable funding.

Monies for traffic control improvements such as those contained in this report can come from several sources. Funds are available on a reimbursement basis, 70% Federal funds and 30% local matching funds, for street construction projects, traffic control devices and other improvements on City streets which are on the Federal Aid Urban System (FAUS). As described in PART III, much of the arterial and collector street mileage in the City is on this system. Consequently, many improvements on these streets could qualify for FAUS funds.

The City also receives a portion of the state gas tax funds which are applicable to various street, roadway, and control improvements in the City.

Another category of funding is the categorical grants established by Title II of the Federal - Aid Highway Act of 1973. The grants fall into five different groups.

The first four cover pavement markings, hazardous locations, roadside obstacles, and railroad crossings on Federal-Aid routes .

The fifth group is the Local Roads 230 Program, which can be utilized for a wide range of improvements including signing, signals, correction of high hazard locations, removal of obstacles, and elimination of railroad hazards. These funds are applicable to any local streets other than those that are part of the Federal-Aid system, but have been interpreted to include intersections at which at least one street is not on the Federal Aid system. All five of these grant types are 90% Federal funding with 10% local matching funds.

An additional source for financing improvements is local City funding. These monies would best be utilized as matching local funds to any categorical grants or Federal Aid monies for which the City might apply.

The Local Roads 230 Program funds would appear to be the most expeditious and efficient source of funding. It is recommended the City pursue this avenue for funding and implementation of study recommendations. The Local Roads 230 Program is administered by the Intergovernmental Department of the Iowa State Highway Commission.

The principal recommendations contained in this report are summarized in the following priority listing. Cost estimates given are for improvements and modifications as described in the text or specified in the supplemental FIGURES.

TABLE 2

PRIORITY LISTING AND COST ESTIMATES

Priority	Recommendation	Cost
1.	Administration and Records - procedural actions as described in PART IV.	--
2.	Establish double alternate progression on Sheridan Avenue signals; clean signal lenses on Sheridan and Thomas.	--
3.	Determine maintenance responsibility at railroad crossings; repair crossing surface.	--
4.	School crossing controls and related signing - as shown in FIGURES 11-17 and discussion in PART IV.	$1,500
5.	Investigation by City of additional off-street parking facilities.	--
6.	Institute proper street, alley, and drive clearances as shown in FIGURE 35.	$ 150
7.	Replace angle parking on Sheridan Avenue in downtown area with tandem parallel parking.	--
8.	Signing and regulatory changes at Sycamore and Lowell, and Thomas and Clarinda.	$ 200
9.	City-wide intersection signing changes - as shown in FIGURE 19, GROUP A (net cost of additional signing needed).	$ 900
10.	Intersection signing and minor geometric improvements as indicated in FIGURES 20-29.	$2,800
11.	Improvements at U. S. 59 and Ferguson, U. S. 59 and Valley, Sheridan and Iowa (high accident locations).	$ 250
12.	Improvements at U. S. 59 and Thomas (FIGURE 32)	$1,400
13.	Other signing and controls, including warning signs near fire station, parking prohibitions, and object markers	$ 700

TABLE 2 - CONT'D

Priority	Recommendation	Cost
14.	Sign and signal improvements at U. S. 59 and Nishna Road:	
	Signing and mast arm signal	$2,100
15.	Intersection signing changes as shown in FIGURE 19, GROUP B	$1,000
16.	Install signal controls and signing at Sheridan and U. S. 59 as shown in FIGURE 31.	$22,000
17.	Construct new corners at Sheridan Avenue intersections of Maple, Elm, Blossom, and Sycamore as shown in FIGURES 36 and 37.	$5,500
18.	Update six signal installations on Sheridan and Thomas Avenues in the downtown as discussed in PART IV. Mast arm installations on Sheridan Avenue would cost an additional $14,000	$57,000
19.	Remove angle parking on Clarinda and Thomas Avenue as suitable off-street parking becomes available.	--

The total sum of all costable recommendations is $95,500.

Certain recommendations are given high priority because their implementation can be begun without great cost. A number of recommendations can be combined when applications for funding are made.

For example, all costed recommendations in priority items 1 through 15 total to $11,000, and together would comprise a package of improvements which would have city-wide benefits to traffic safety. Items 17 and 18 should probably be performed concurrently.

There are other lesser recommendations which do not appear in TABLE 2 or are referred to only generally. The text of PART IV should be consulted with regard to these recommendations.

APPENDIX

Accident Collision Diagrams

Traffic Flow Diagrams

Intersection Visibility Ordinance

School Crossings: A Comment

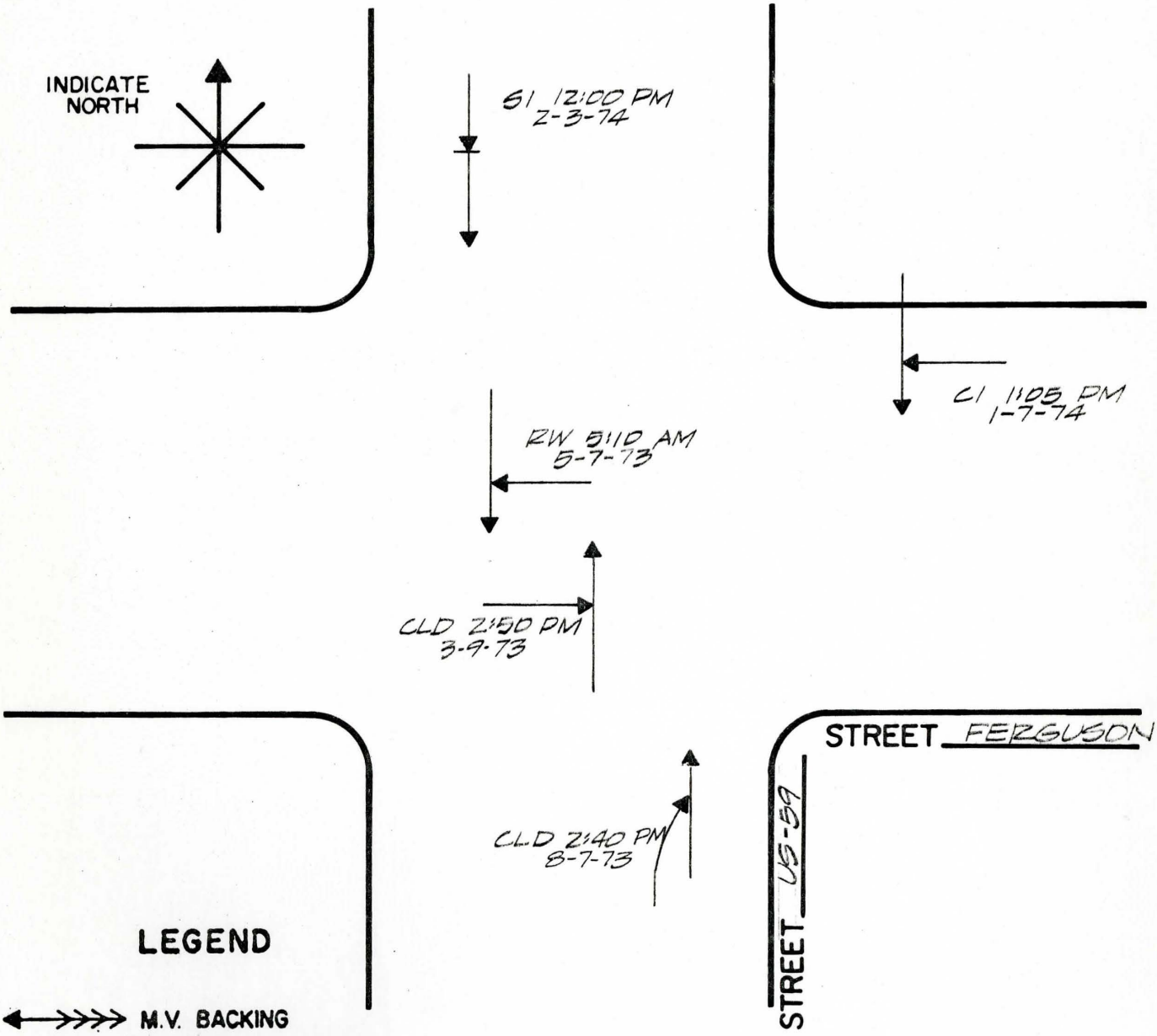
List of References

ACCIDENT COLLISION DIAGRAMS

ACCIDENT
COLLISION DIAGRAM

LOCATION US-59 - FERGUSON

PERIOD 1973-1974



LEGEND

- M.V. BACKING
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- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

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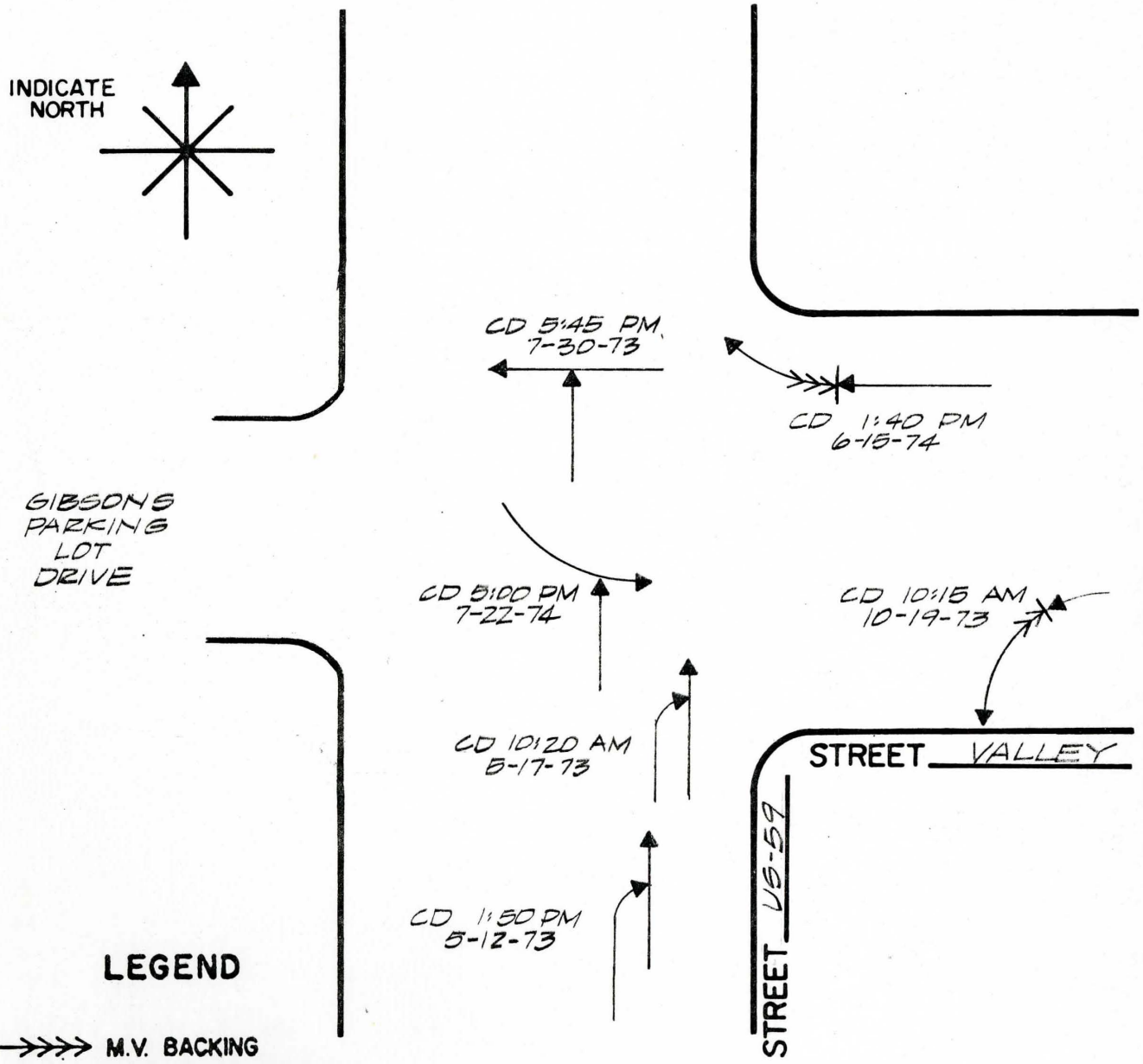
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN
S=SNOW SL=SLEET
CL=CLOUDY

ACCIDENT
COLLISION DIAGRAM

LOCATION US-59 - VALLEY

PERIOD 1973-1974



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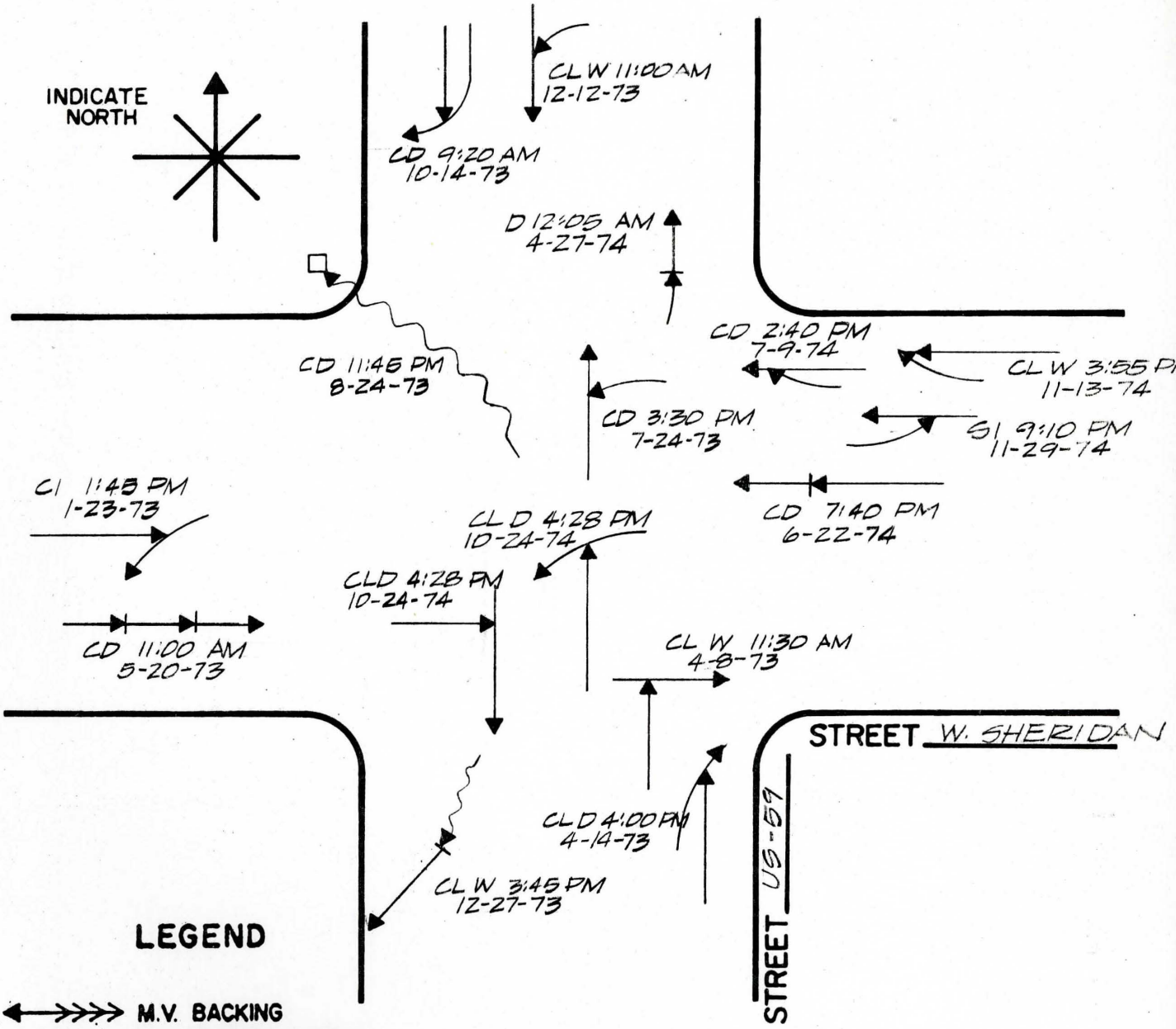
ACCIDENT COLLISION DIAGRAM

LOCATION US-59 - SHERIDAN PERIOD 1973-1974



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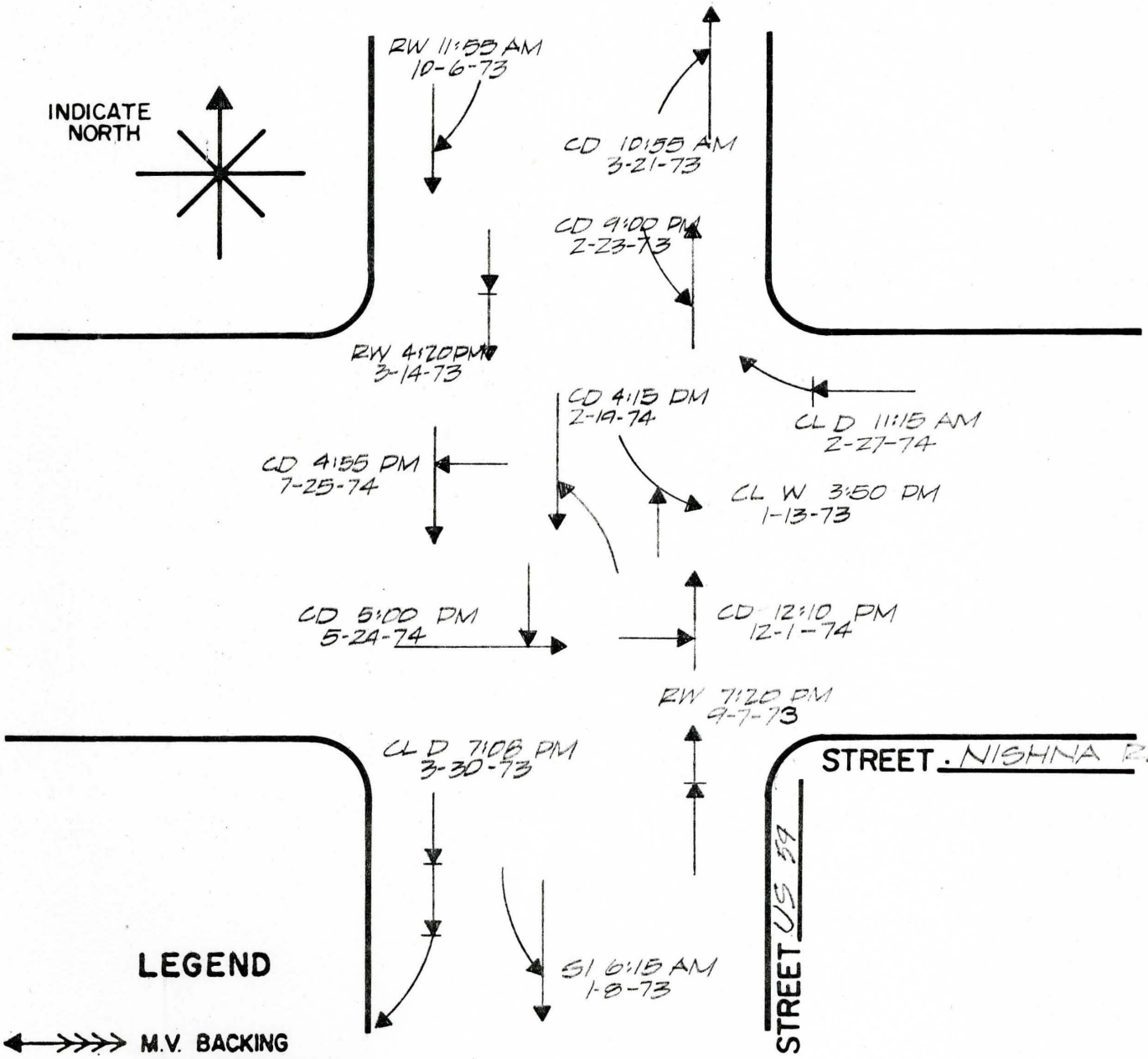
ACCIDENT
COLLISION DIAGRAM

LOCATION NISHNA RD. - US 59

PERIOD 1973-1974



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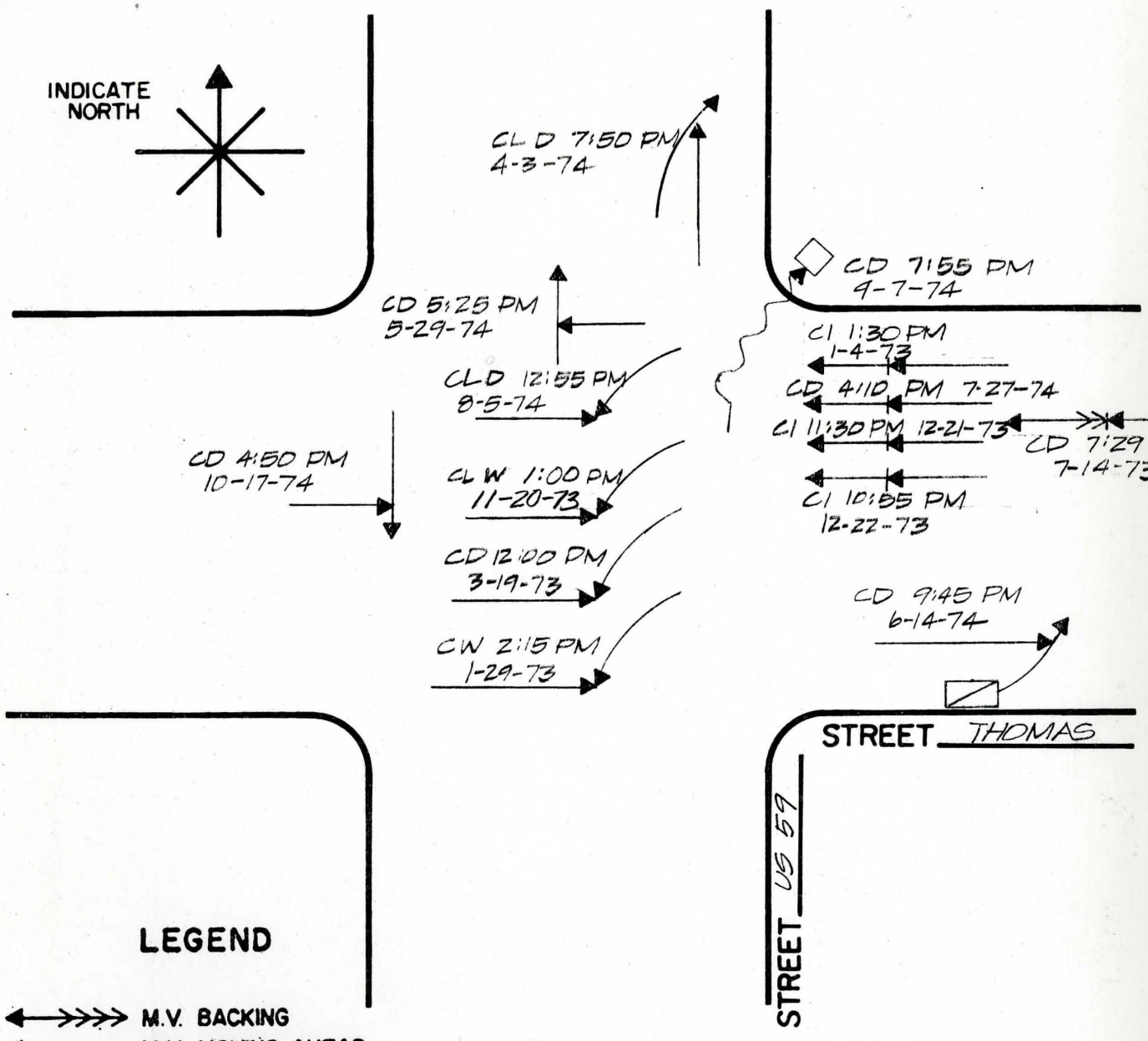
ACCIDENT
COLLISION DIAGRAM

LOCATION THOMAS - US 59 - SH 2 PERIOD 1973-1974



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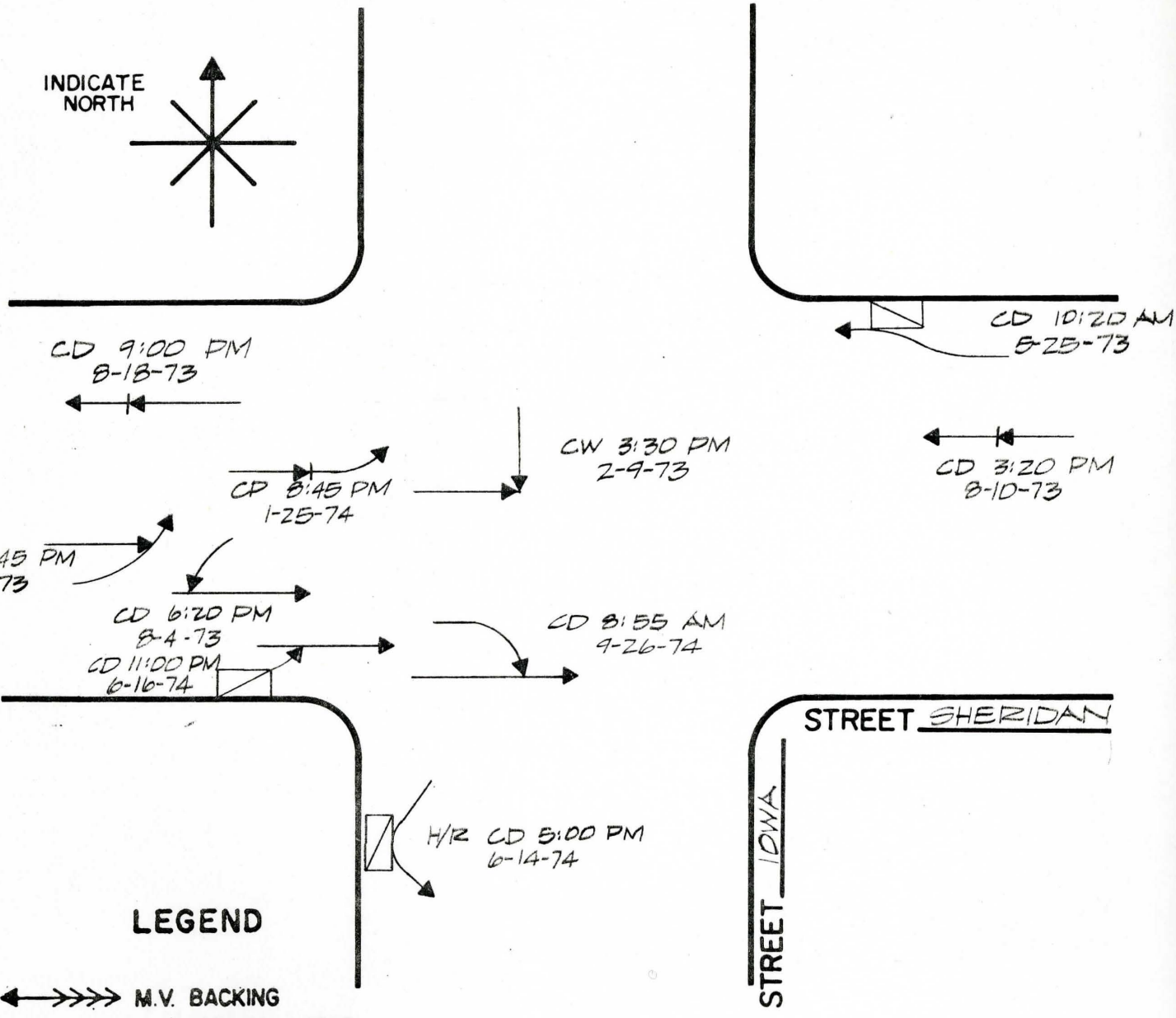
ACCIDENT
COLLISION DIAGRAM

LOCATION SHERIDAN & IOWA

PERIOD 1973-1974



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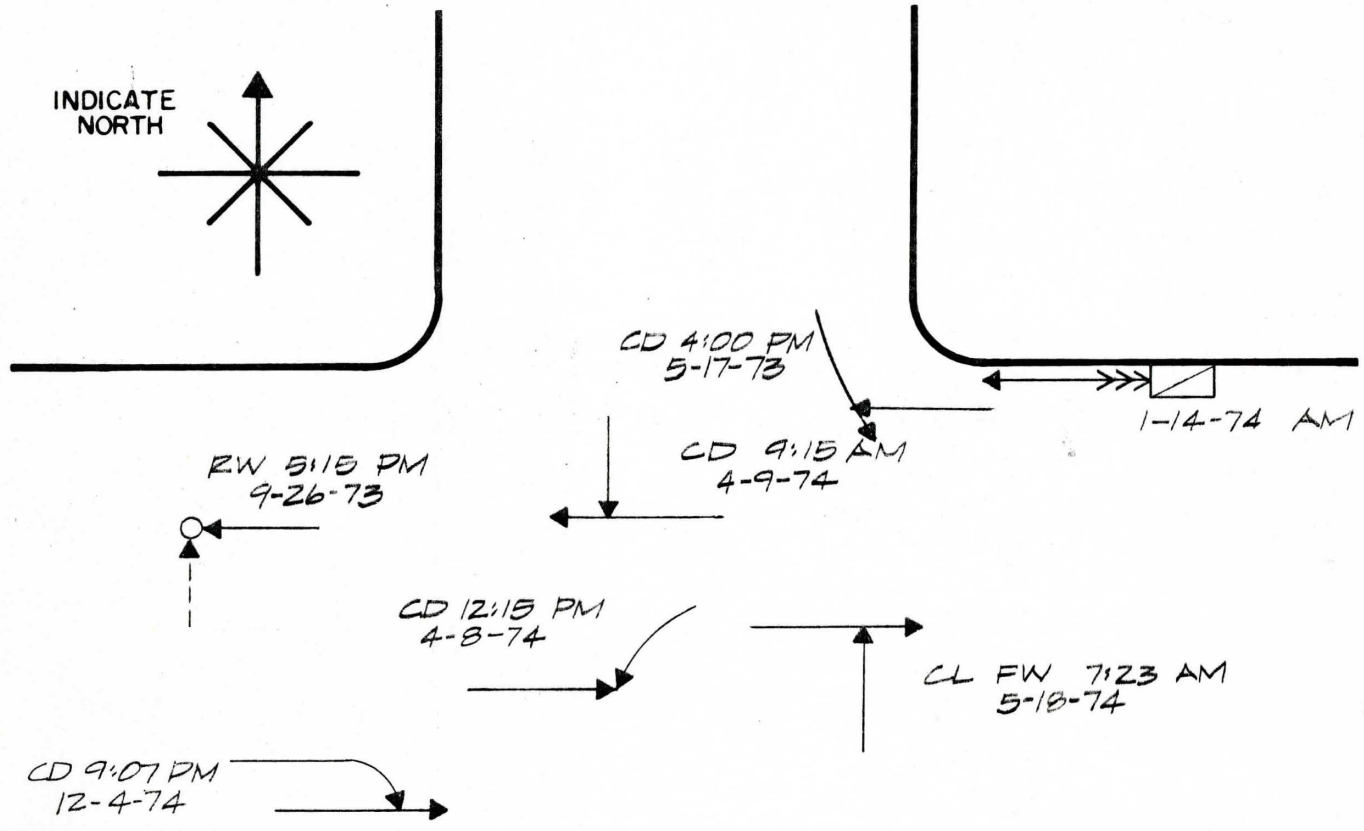
ACCIDENT
COLLISION DIAGRAM

LOCATION SYCAMORE - VALLEY PERIOD 1973-1974



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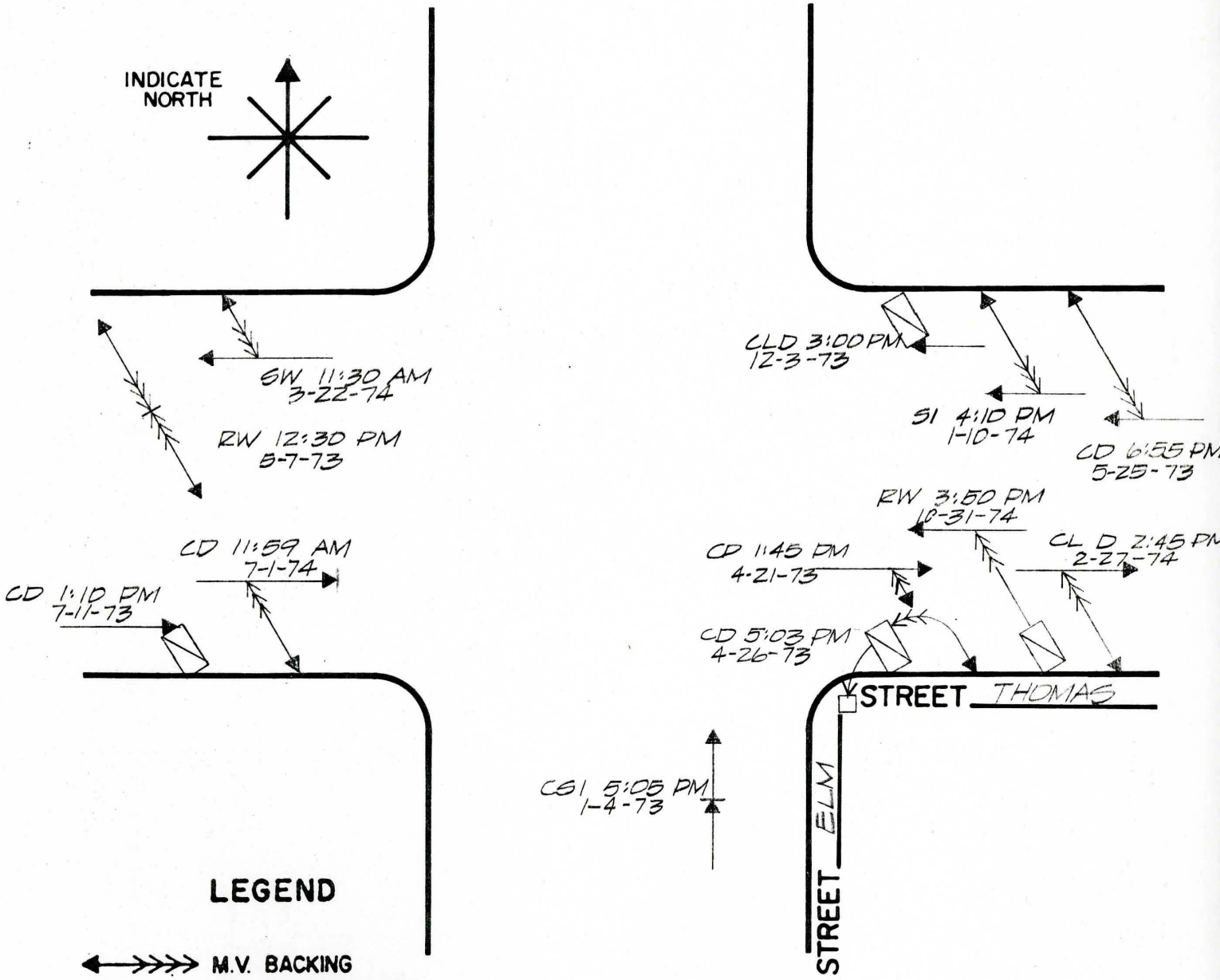
ACCIDENT COLLISION DIAGRAM

LOCATION ELM-THOMAS

PERIOD 1973-1974



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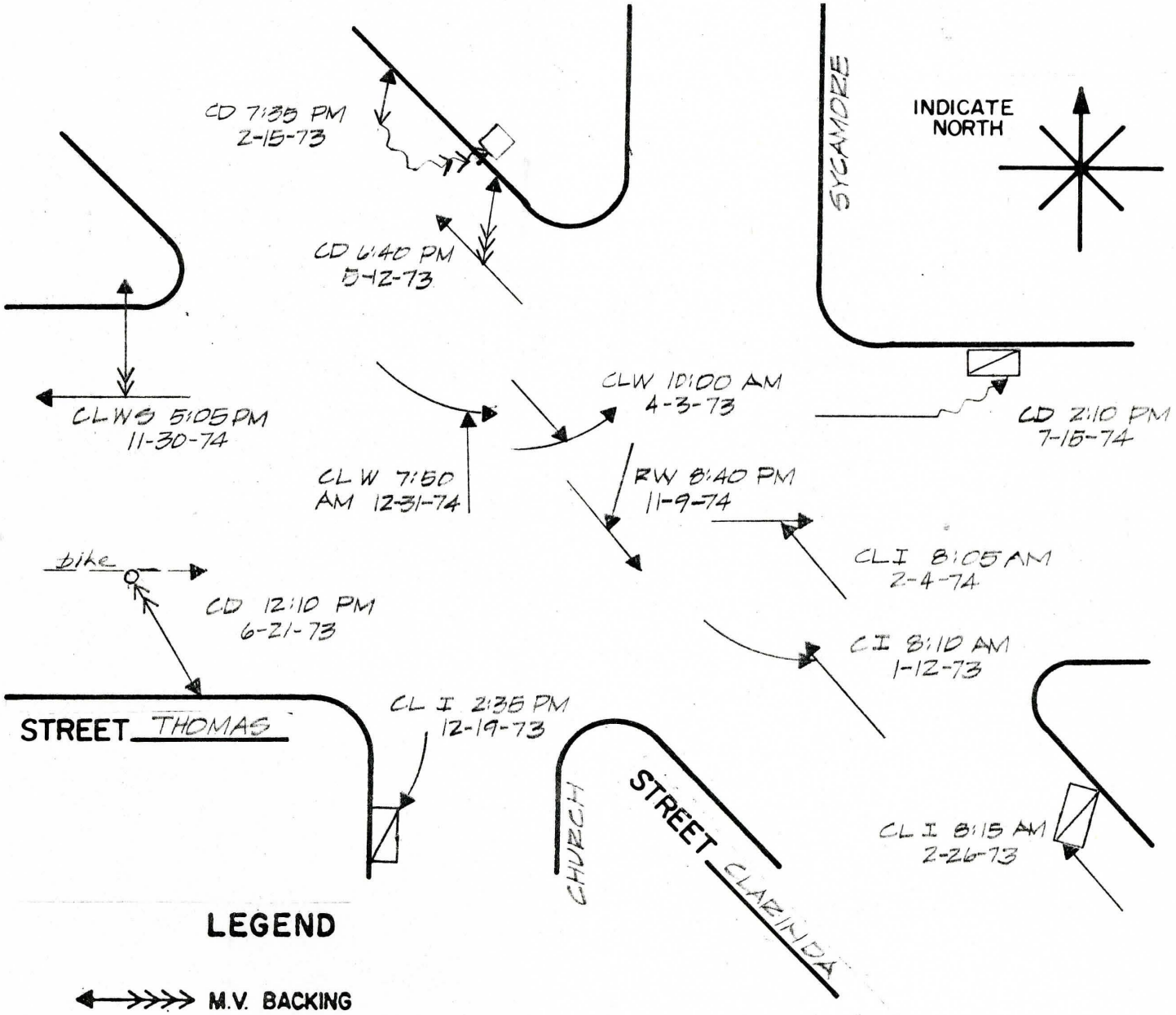
ACCIDENT
COLLISION DIAGRAM

LOCATION THOMAS - CLARINDA

PERIOD 1973-1974



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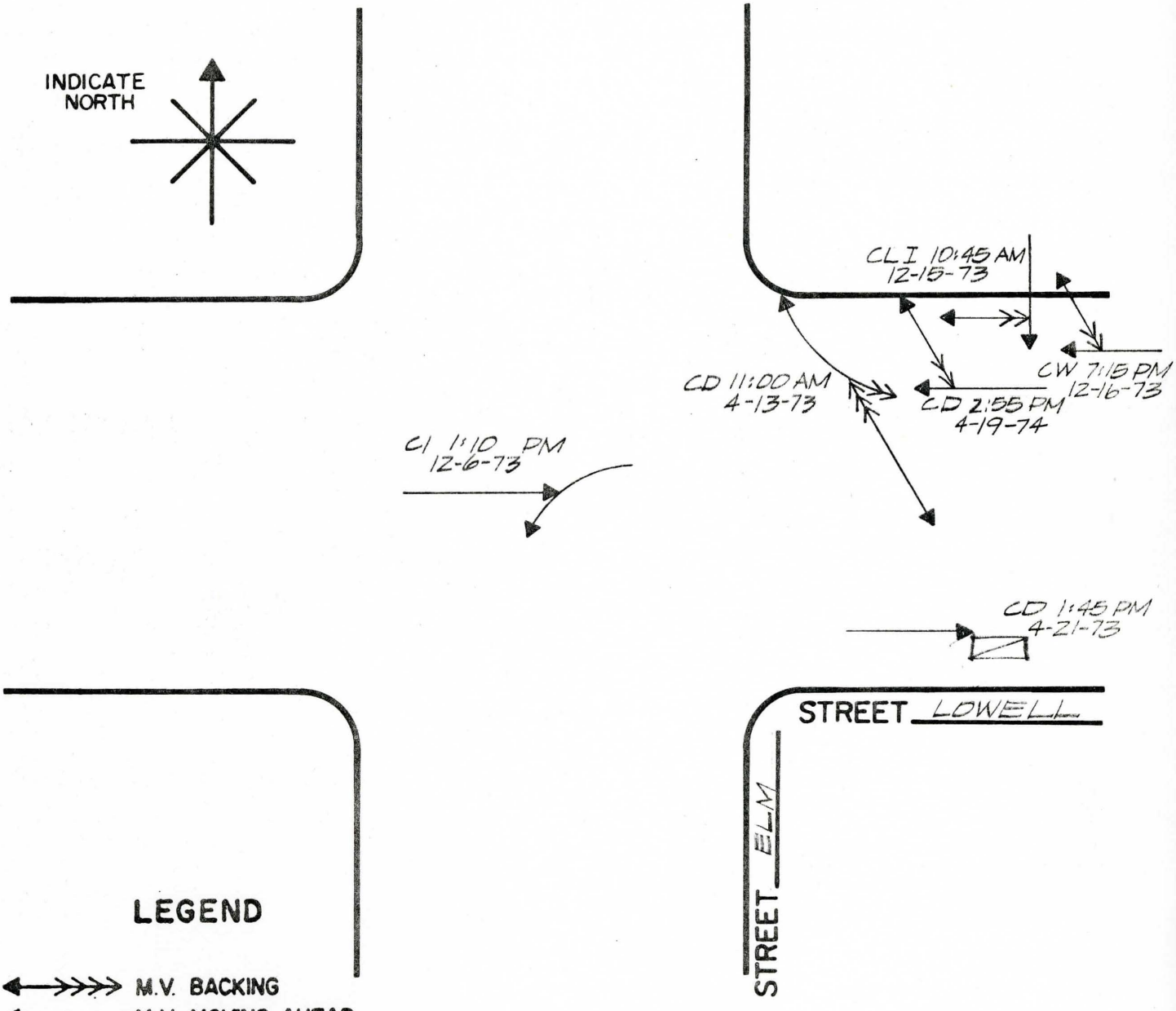
ACCIDENT
COLLISION DIAGRAM

LOCATION LOWELL-ELM

PERIOD 1973-1974



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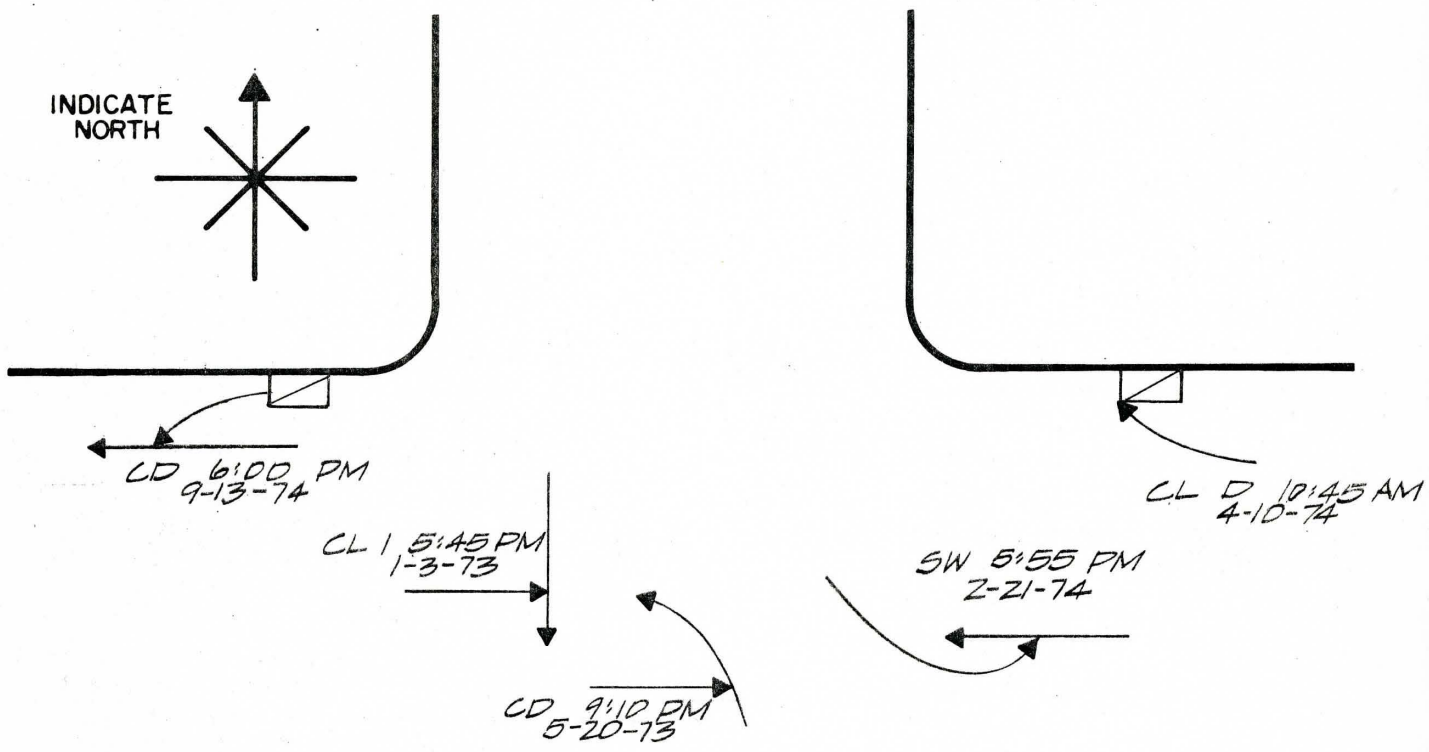
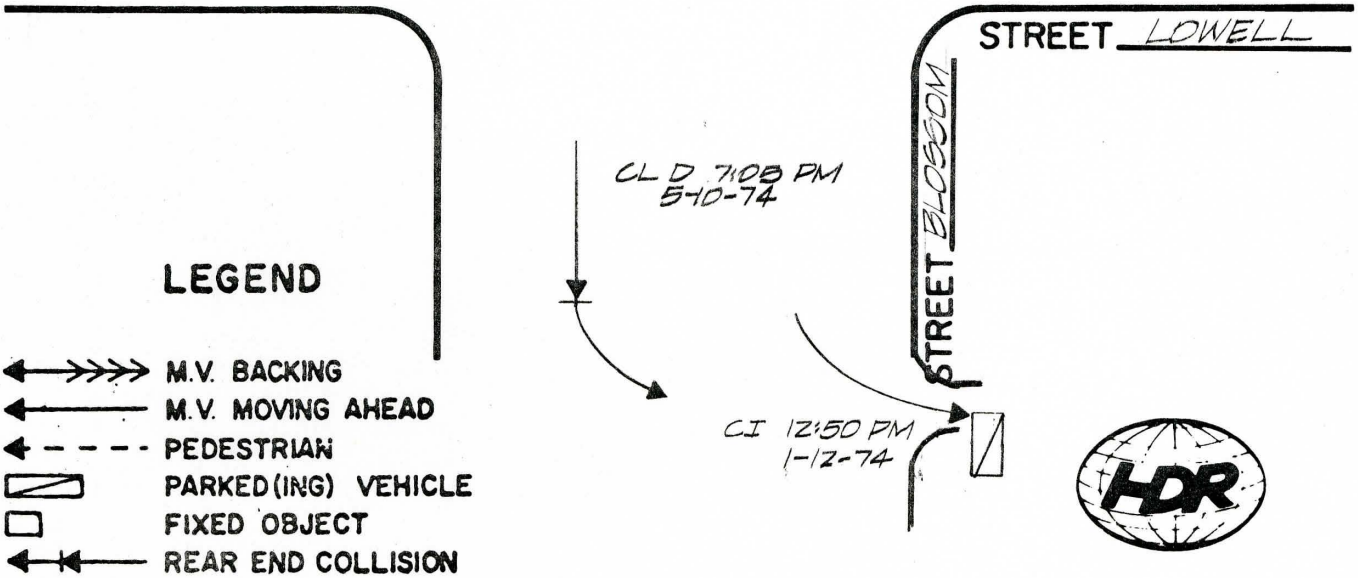
HDR

ACCIDENT
COLLISION DIAGRAM

LOCATION LOWELL - BLOSSOM

PERIOD 1973 - 1974





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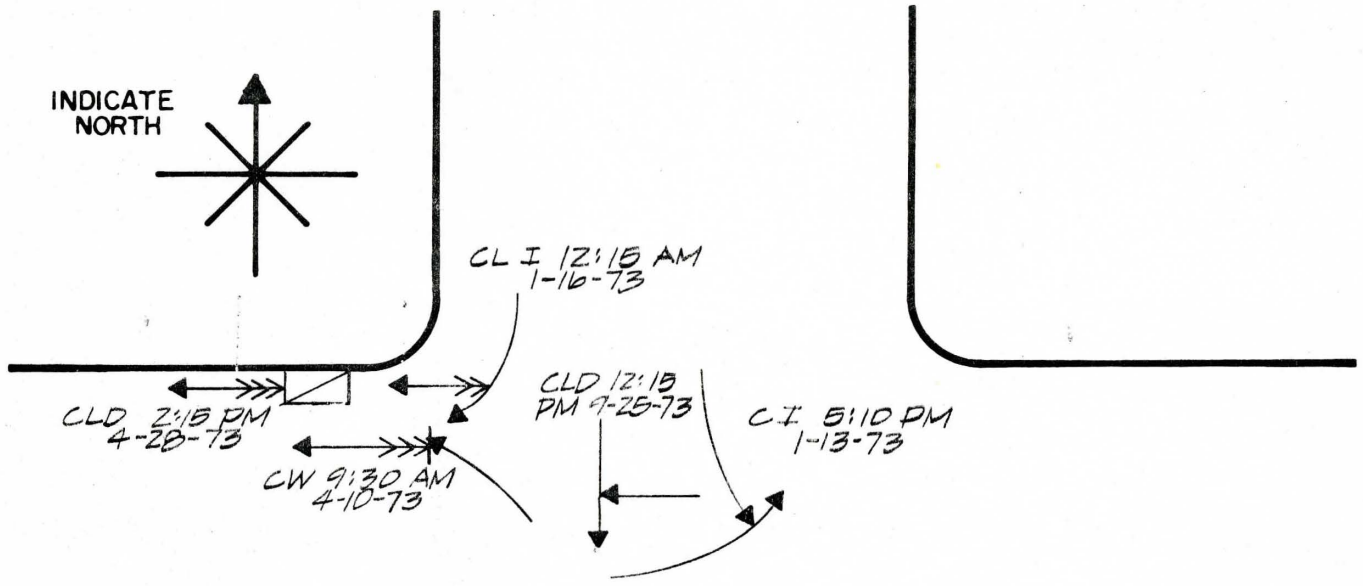
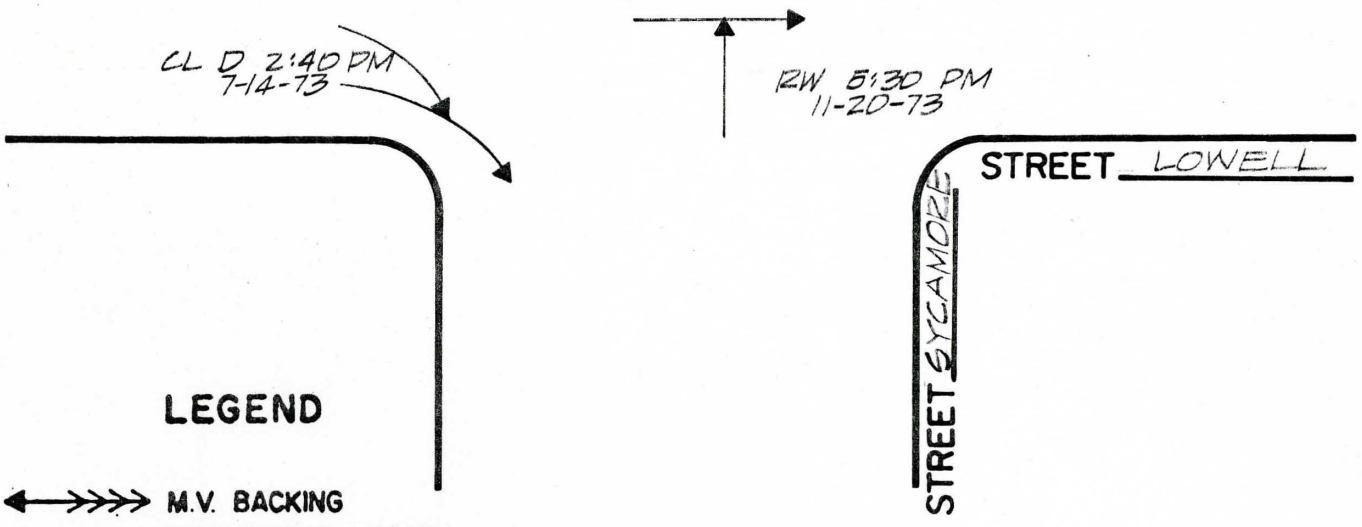
ACCIDENT
COLLISION DIAGRAM

LOCATION LOWELL - SYCAMORE PERIOD 1973 - 1974





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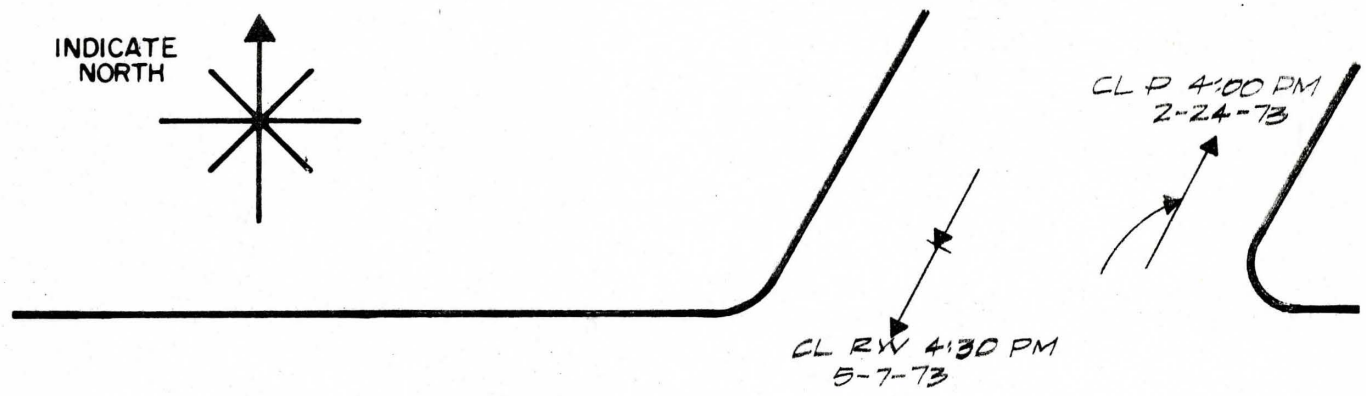
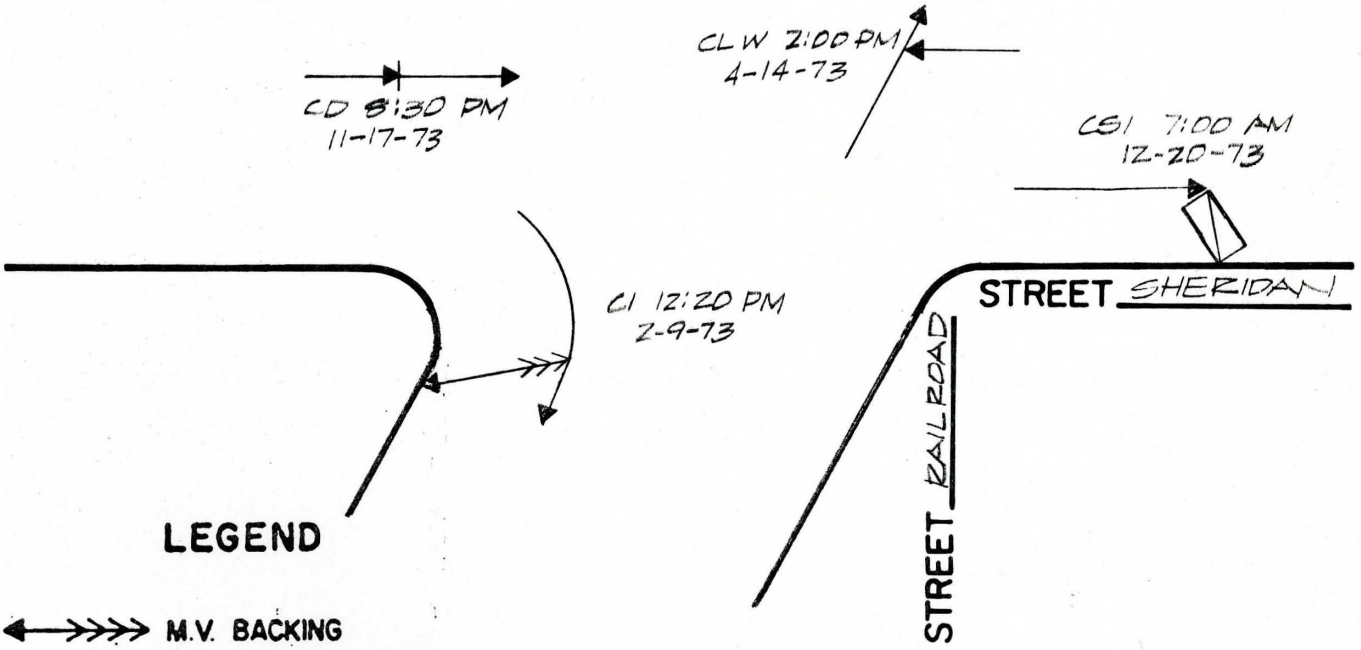
ACCIDENT
COLLISION DIAGRAM

LOCATION SHERIDAN - RAILROAD PERIOD 1973-1974





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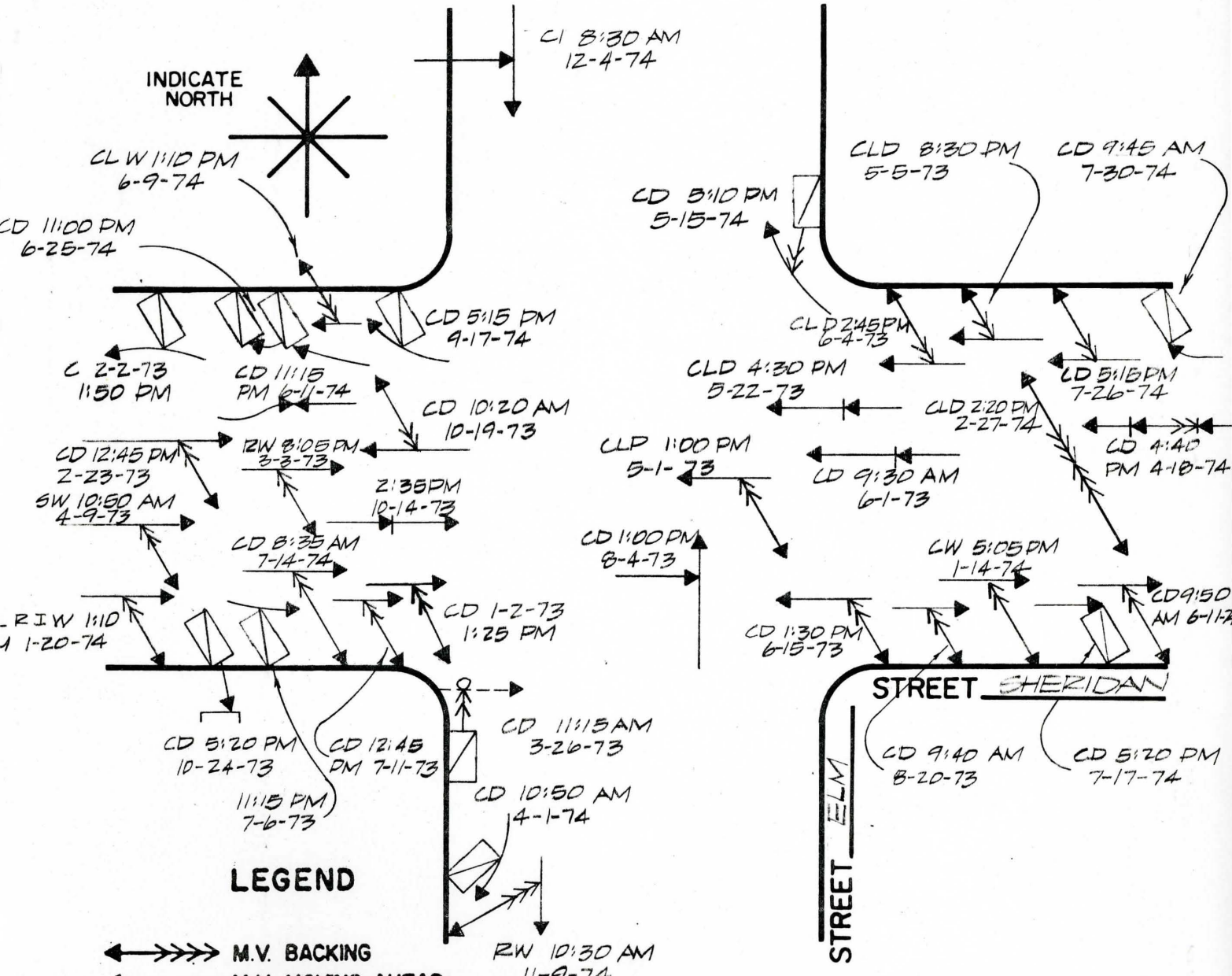
ACCIDENT COLLISION DIAGRAM

LOCATION SHERIDAN - MAPLE PERIOD 1973-1974

ACCIDENT
COLLISION DIAGRAM

LOCATION SHERIDAN - ELM

PERIOD 1973-1974



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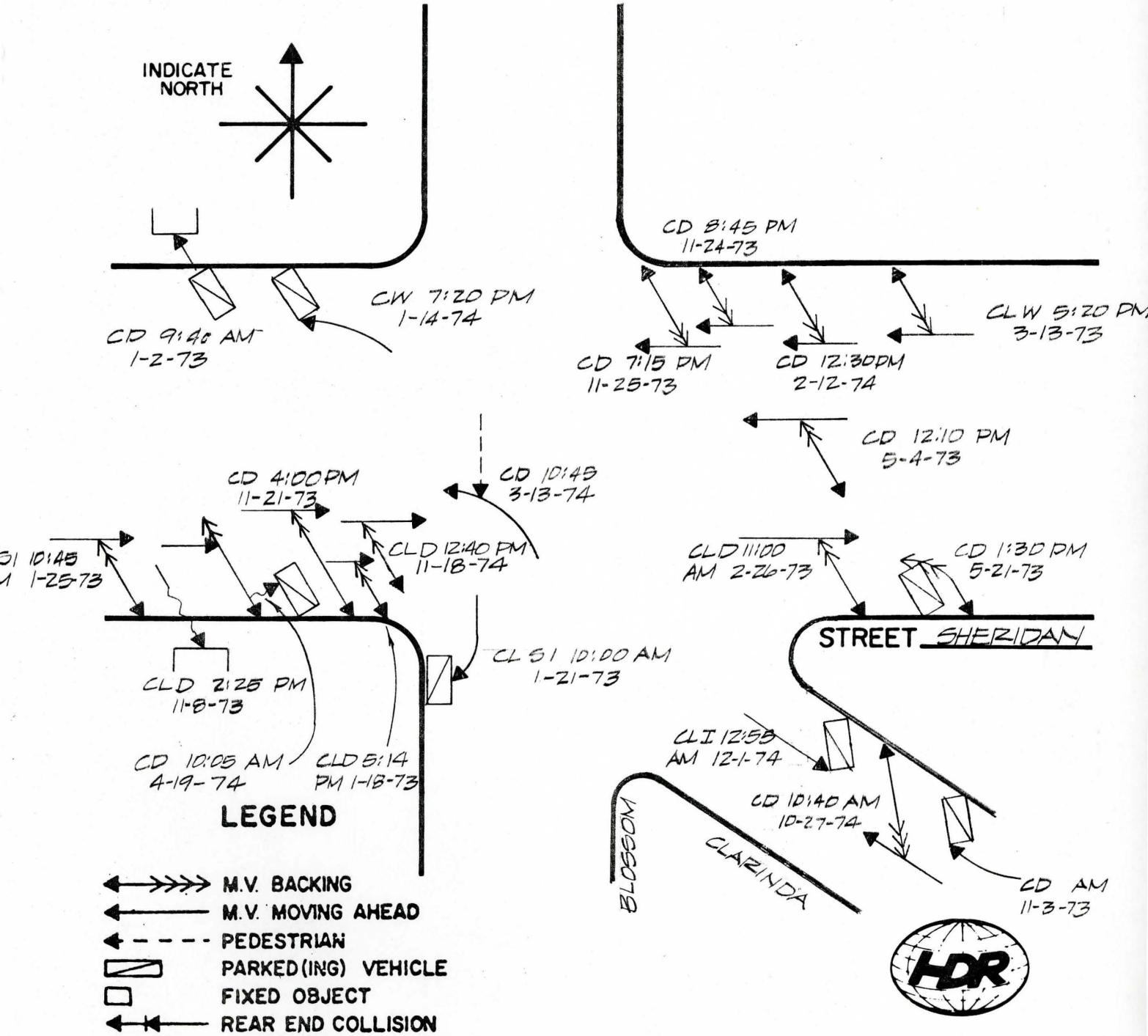
ACCIDENT COLLISION DIAGRAM

LOCATION SHERIDAN - BLOSSOM

PERIOD 1973-1974



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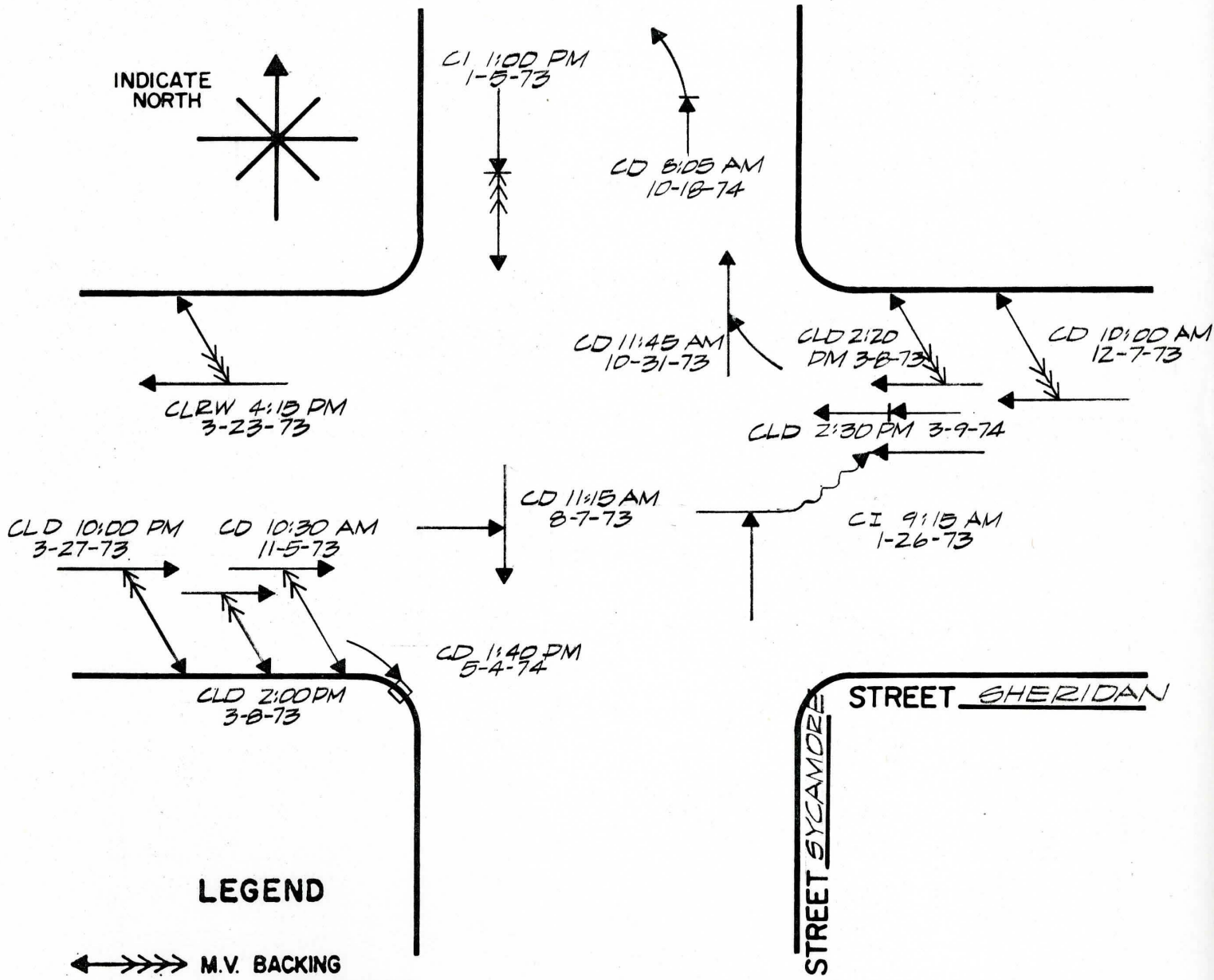
ACCIDENT
COLLISION DIAGRAM

LOCATION SHERIDAN-SYCAMORE PERIOD 1973-1974



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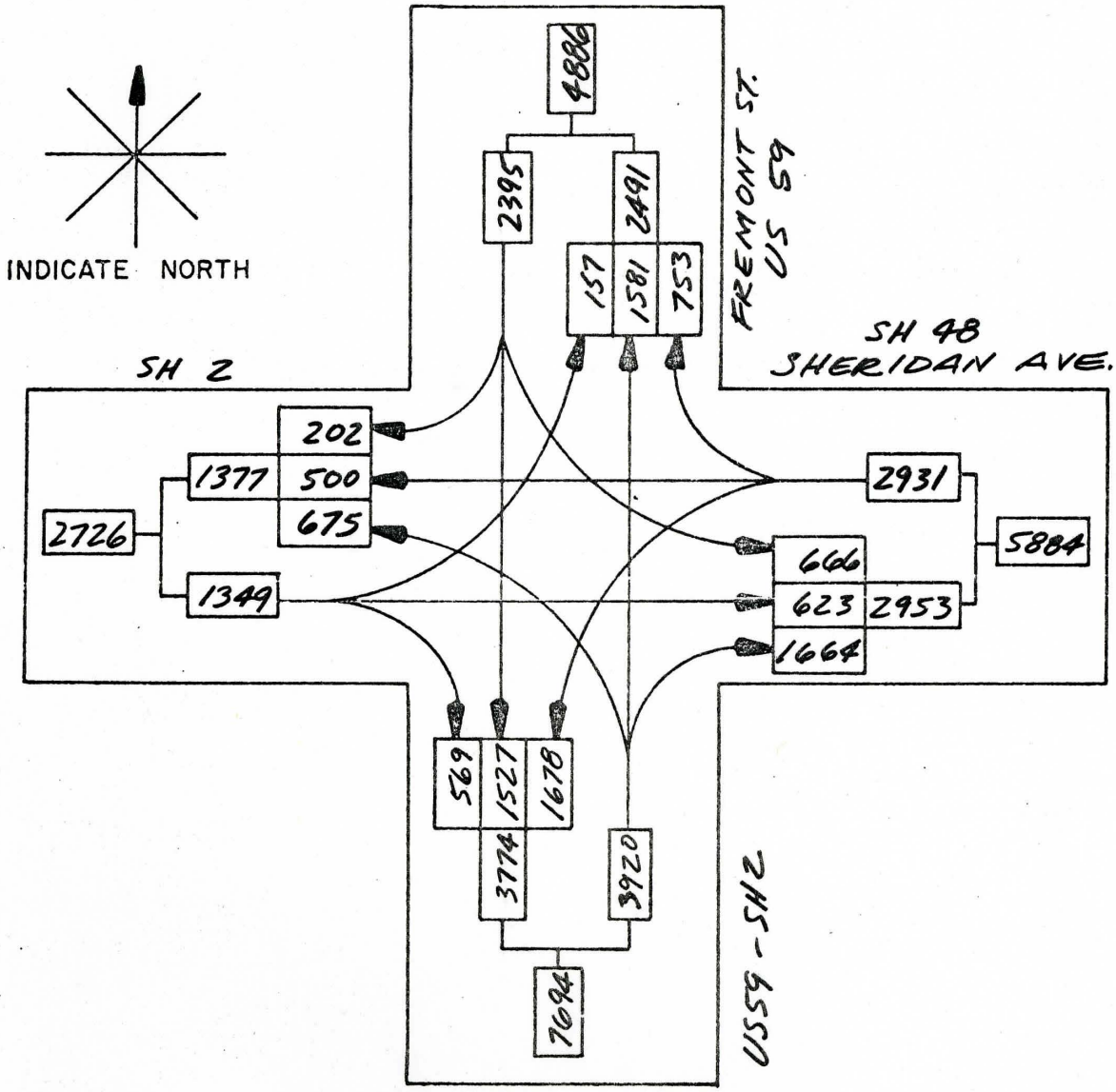
TRAFFIC FLOW DIAGRAMS

VEHICULAR TRAFFIC AT THE INTERSECTION OF

SHERIDAN AVE & FREMONT ST.

S.H. 48, U.S. 59, S.H. 2



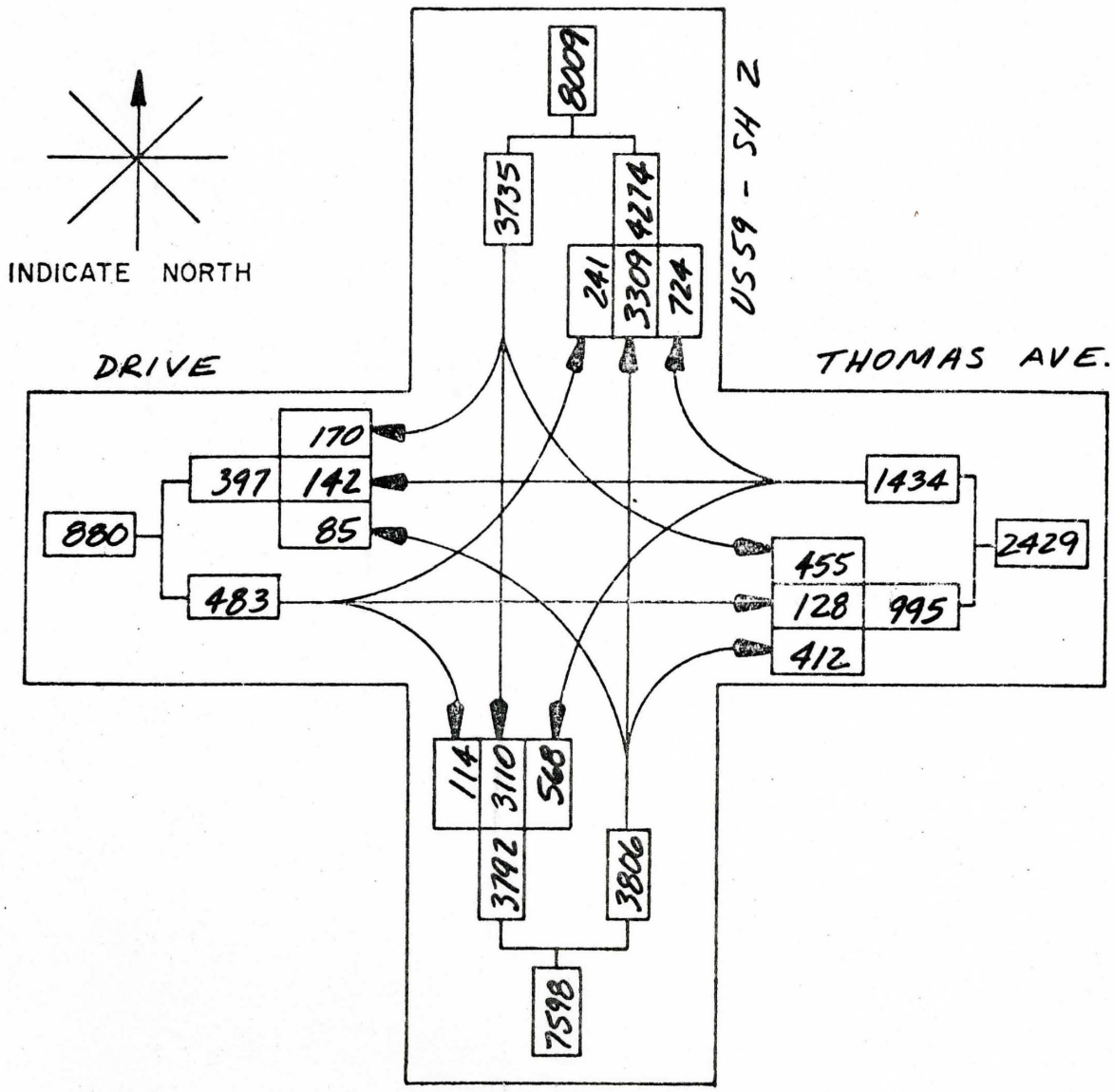
TYPE ADT

PERIOD 1974

SOURCE: IOWA STATE HIGHWAY COMMISSION

VEHICULAR TRAFFIC AT THE INTERSECTION OF

US 59 - SH 2 (FREMONT ST) & THOMAS AVE.

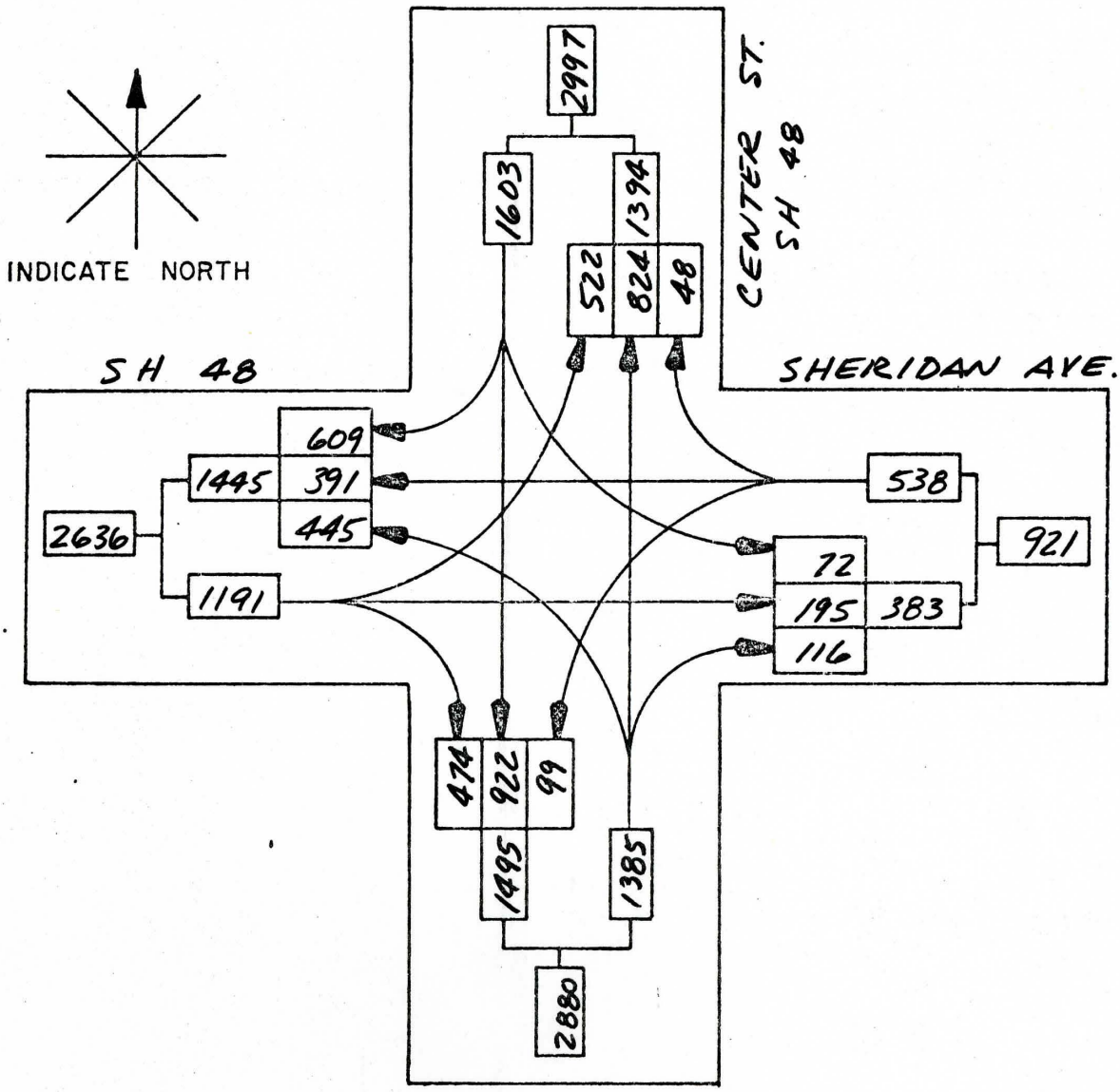


TYPE ADT

PERIOD 1975

VEHICULAR TRAFFIC AT THE INTERSECTION OF

SHERIDAN AVE & CENTER ST.



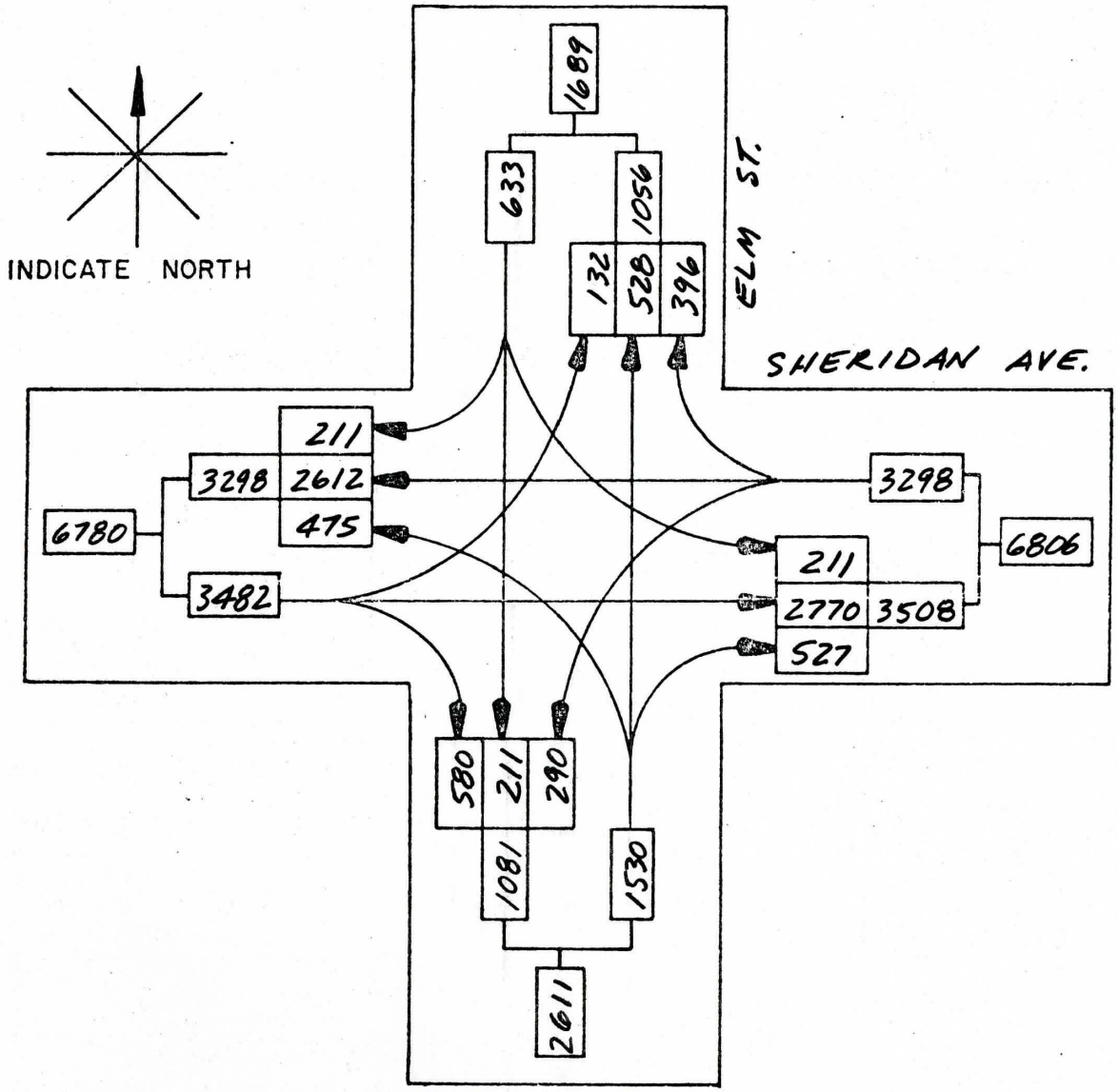
TYPE ADT

PERIOD 1974

SOURCE: IOWA STATE HIGHWAY COMMISSION

VEHICULAR TRAFFIC AT THE INTERSECTION OF

SHERIDAN AVE & ELM ST

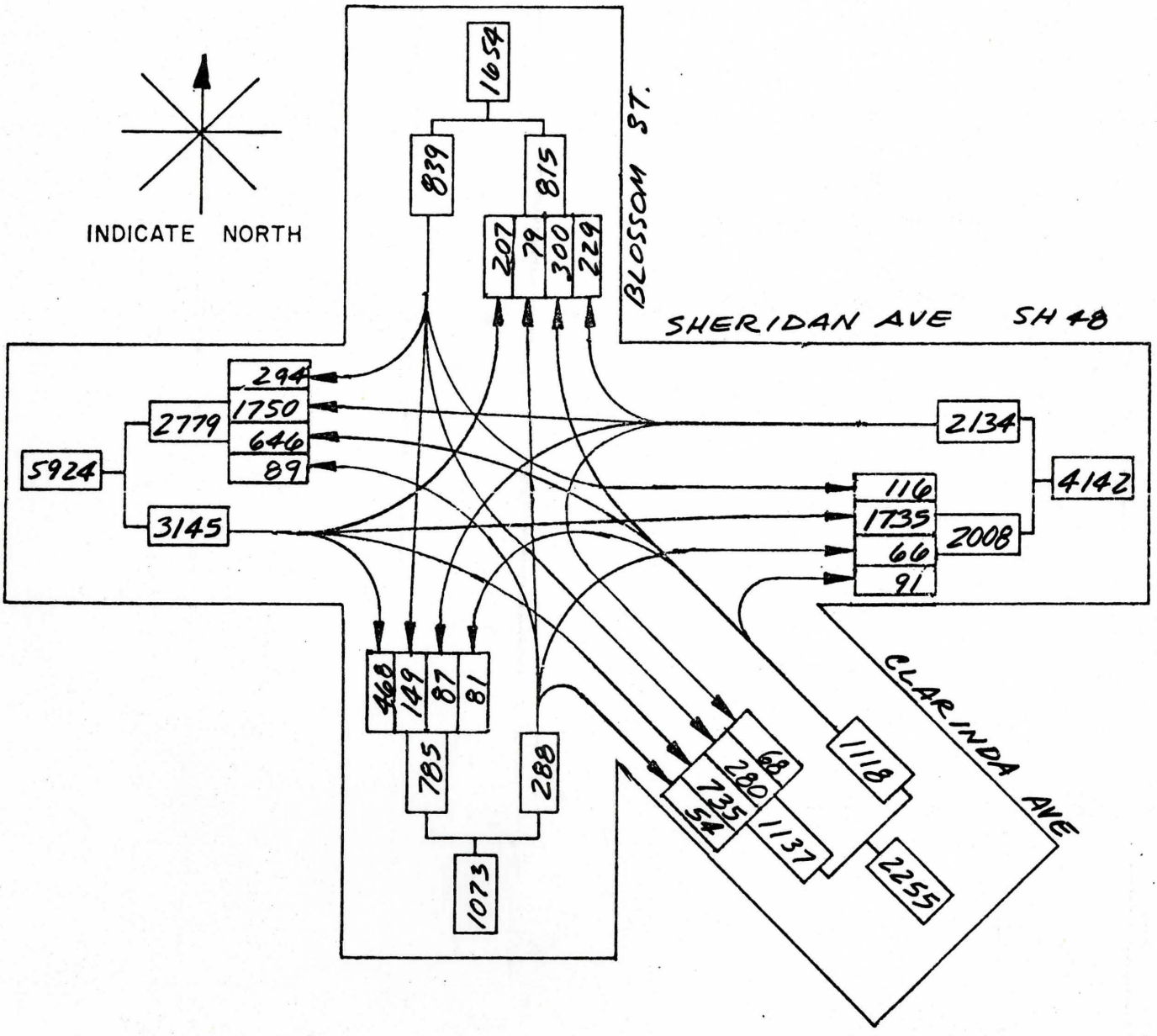


TYPE ADT

PERIOD 1975

VEHICULAR TRAFFIC AT THE INTERSECTION OF

SHERIDAN AVE, BLOSSOM ST, & CLARINDA AVE.



TYPE ADT

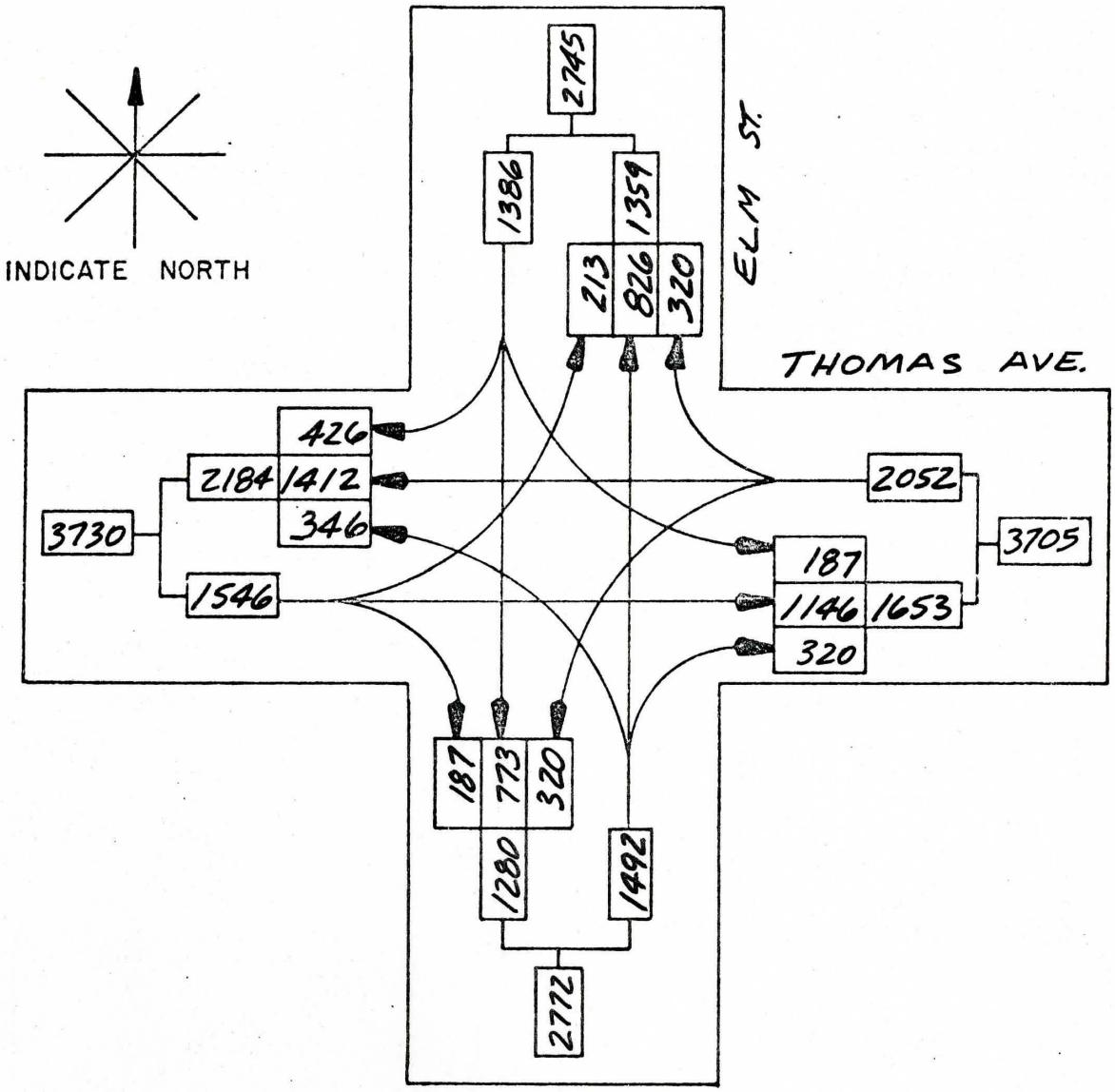
PERIOD 1974

SOURCE: IOWA STATE HIGHWAY COMMISSION

HDR

VEHICULAR TRAFFIC AT THE INTERSECTION OF

THOMAS AVE. & ELM ST.

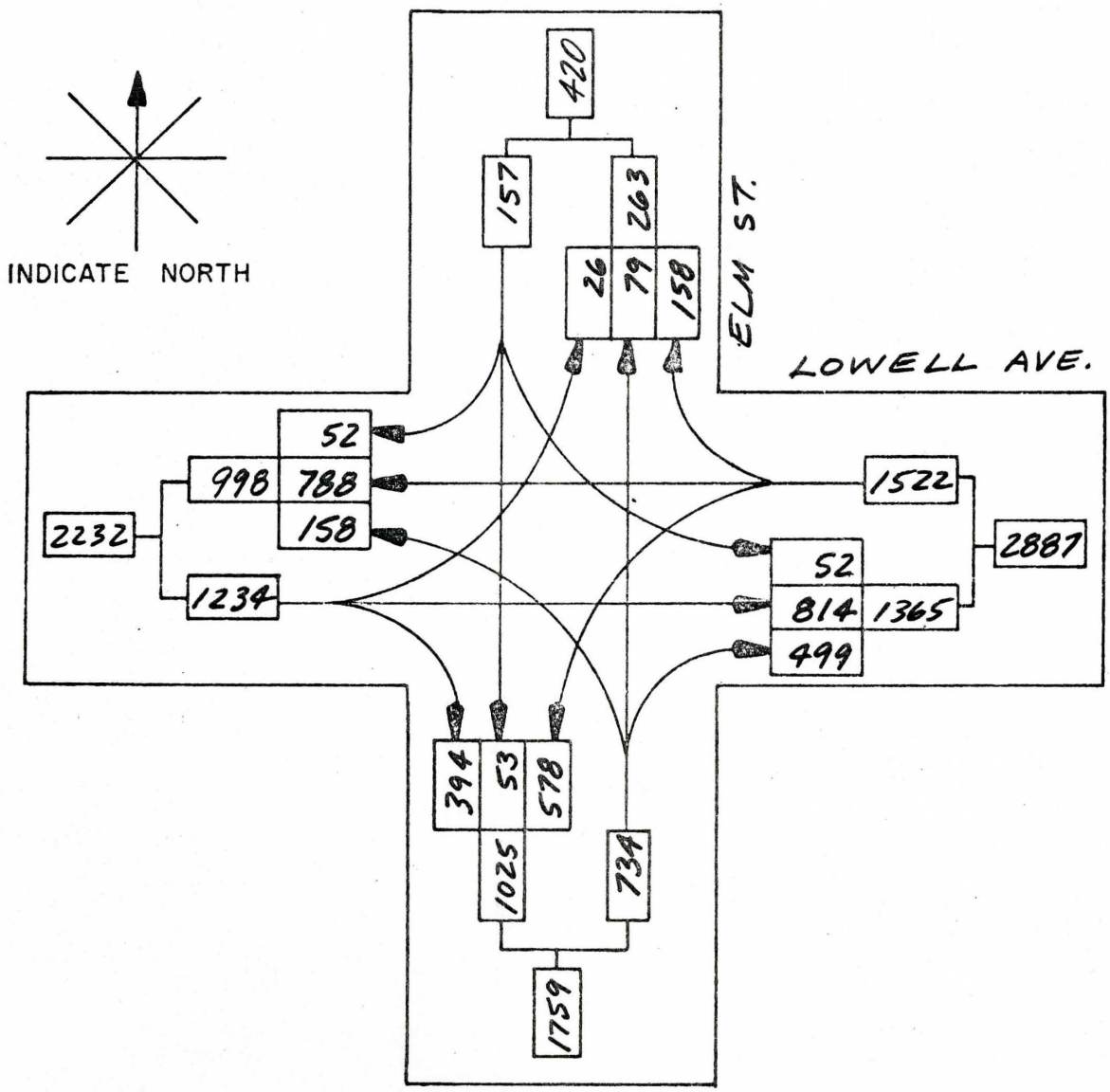


TYPE ADT

PERIOD 1975

VEHICULAR TRAFFIC AT THE INTERSECTION OF

LOWELL AVE & ELM ST.

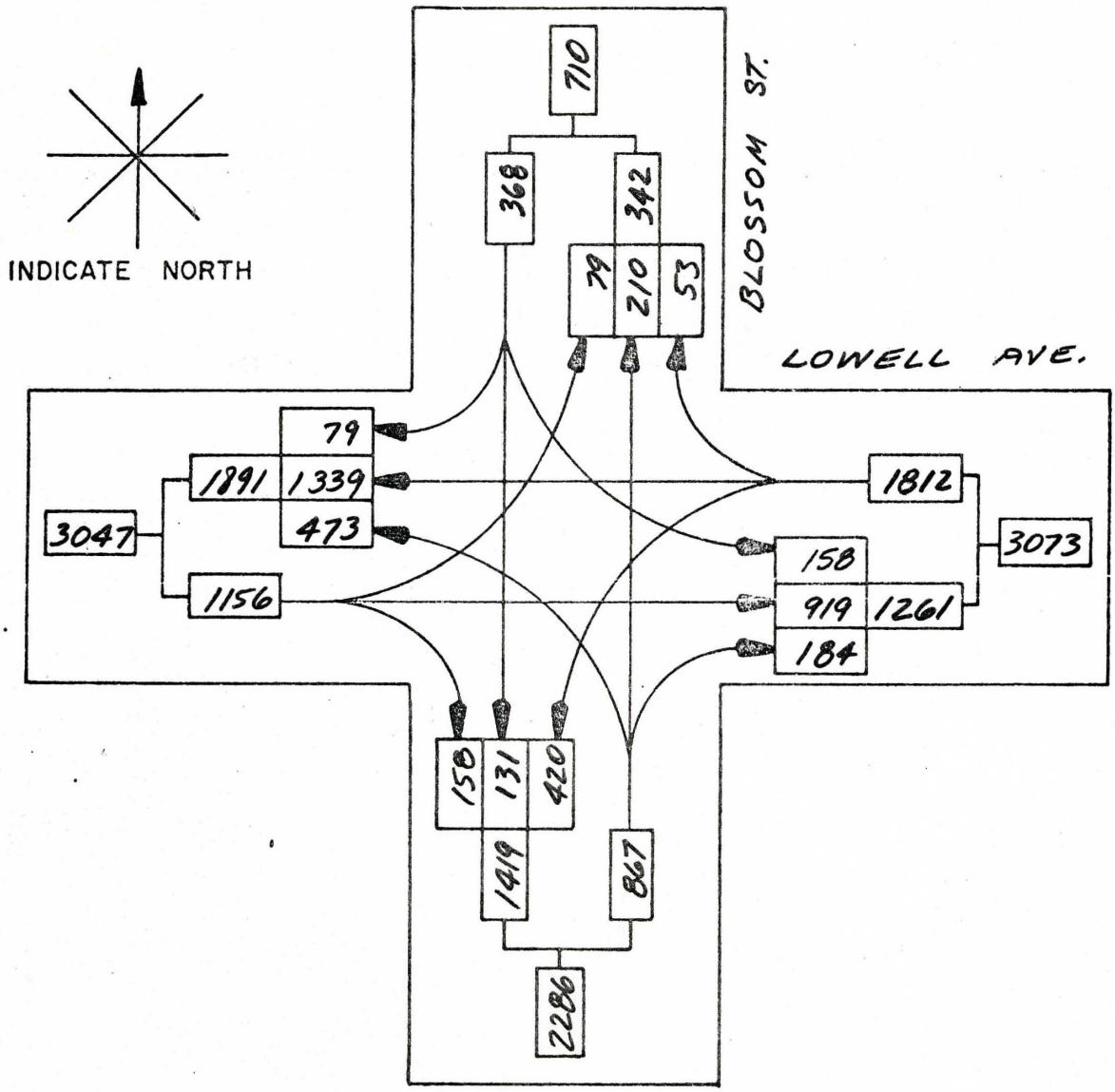


TYPE ADT

PERIOD 1975

VEHICULAR TRAFFIC AT THE INTERSECTION OF

LOWELL AVE. & BLOSSOM ST.

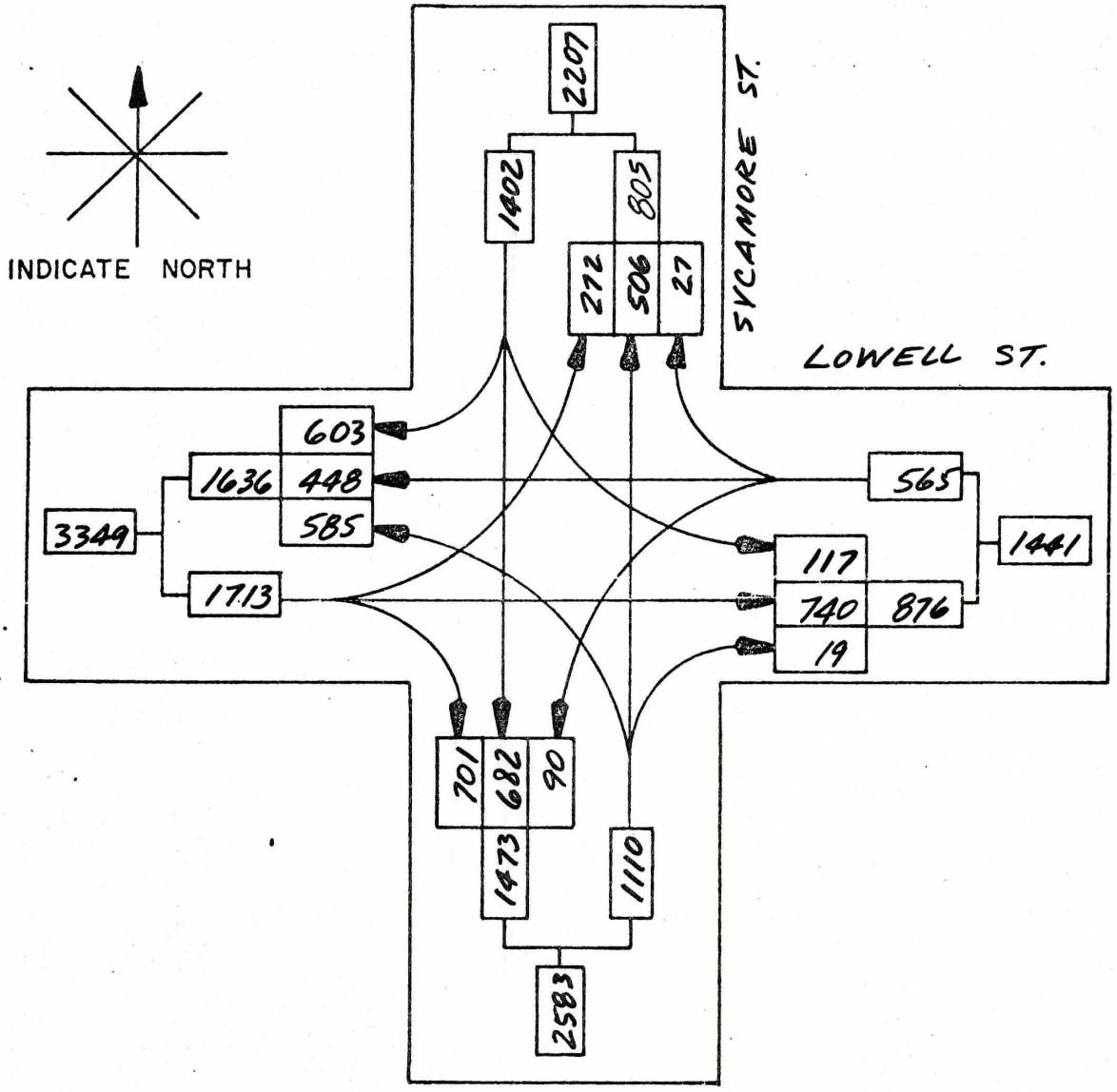


TYPE ADT

PERIOD 1975

VEHICULAR TRAFFIC AT THE INTERSECTION OF

SYCAMORE ST. & LOWELL ST

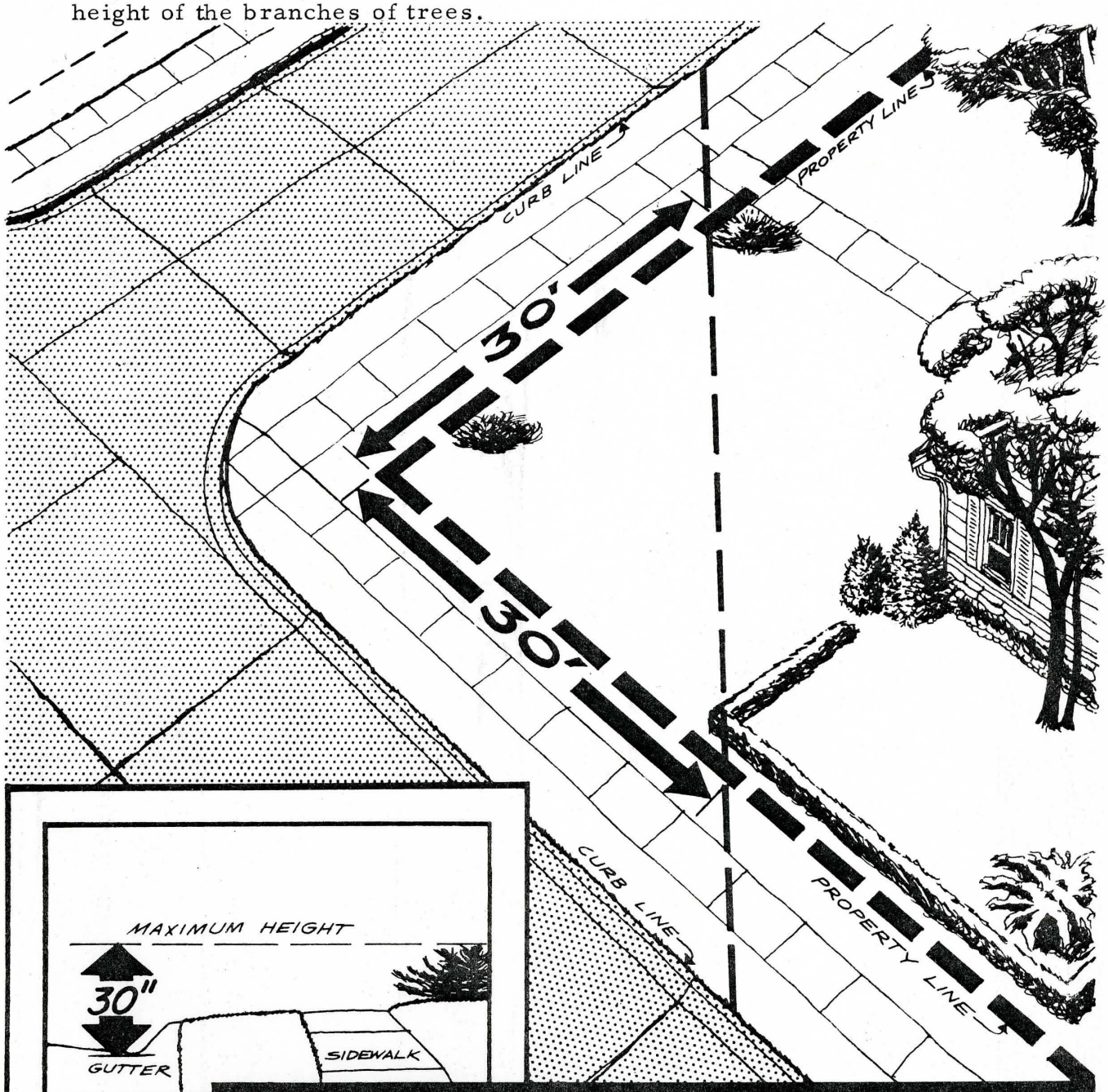


TYPE ADT

PERIOD 1975

INTERSECTION VISIBILITY ORDINANCE

The City of Omaha ordinance relating to sight distances at intersections appears below. Such ordinances often include restrictions on the minimum height of the branches of trees.



21.04.130 Shrubbery near street intersection—Height. (a) It is hereby declared unlawful for any person, firm or corporation to plant, grow, keep, or maintain, or cause to be planted, grown, kept or maintained any hedge, bush or shrubbery of any kind or nature more than two and one-half feet in height above the roadway within the triangle formed by the adjacent side lines of two intersecting streets and the line joining points distant thirty feet on each side line from their point of intersection.

(b) For the purpose of this section "side line" of street, shall mean the property line. (Ord. 14924 § 56-1.13, as amended by Ord. 21423; September 6, 1960).

SCHOOL CROSSINGS: A COMMENT

(The following article by Jan Bierman was submitted as a Letter to the Editor and appeared in the Des Moines Register and Tribune, October 1974)

There is no such thing as a "safe route", where the combination of motor vehicles and children occurs. Some day, by some fantastic stroke of luck, people are going to realize this and work toward educating children and drivers in this direction. A child must learn to cross the street independently -- with a healthy respect for vehicles -- without dependency upon Adult Crossing Guards or "Safety Bugs", which are available only at school times. A driver must learn to SEE what is around him and to watch especially for children whose traffic judgment is still developing.

Parents need to spend time teaching traffic values in the home, and demonstrating these values in a positive way on the streets as they come into contact with traffic. Licensing requirements and education of drivers need to be more thorough, with emphasis on children at ALL times, not just near schools or on school routes.

Individual priorities need to be reassigned, so if any mother feels her child is in danger at a crossing, she will be with that child showing him what he needs to watch for -- for the other times and other crossings he may need to make when she is not there. A Crossing Guard has no more control over traffic than a parent has and provides the type of assistance that fosters acceptance of protection in place of independent learning.

It is unrealistic to interpret "safe route" in a literal sense. It was not intended to be understood in that way, and was a poor choice of words by trusting-type officials who felt most people were of reasonable intelligence.

Separation of children and traffic is the only sure way to avoid tragedies. The next best way is to equip our kids on a round-the-clock basis through education of both children and drivers, along with acceptance of responsibility by those who really have the most to gain.

We can educate and accomplish some long term benefits. Or we can assign more Crossing Guards during school times and leave kids to their own resources after 3:45 each school day; and ALL DAY each day throughout week-ends and summer vacations -- which is what we're doing now to "protect our children".

It is not enough. And we need to decide if safety at school times is all we really care about.

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